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AMERICAN ANTIQUITY

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THE PROBLEM OF NORTHWEST COASTAL-INTERIOR RELATIONSHIPS AS SEEN FROM SEATTLE *

DOUGLAS OSBORNE, WARREN W. CALDWELL, AND ROBERT H. CRABTREE

FOR THE past several years Charles Borden of the University of British Columbia has been carrying out a most promising attack on the problems of Northwest prehistory, primarily in the Fraser Delta area. Strongly influenced by the latter-day rigorous school of German archaeologists, his field work is thorough and impeccable. His short reports, published in *Anthropology in British Columbia* from 1950 through 1953-54 have been more than of a preliminary nature. They have taken on, increasingly, the characteristics of final interpretative statements. Throughout the series Borden has followed and expanded, on the basis of several excellent and productive excavations, the thesis developed by Harlan I. Smith (1903, 1907), Boas (1902) and Drucker (1943), and others that culture development and change along the Pacific coast has depended upon either migrations or cultural diffusion from the Interior (the Plateau or the Athabascan hinterland) to the Coast. Further, his digging has brought to light an occupation of the coast which was not noted, as far as we are aware, by previous workers. This occupation is remarkable for a series of Arctic or Circumpolar traits and was first called "Eskimoid" by Borden. He has since, though not yet in print, expressed a preference for the term *Early Maritime*. It was upon the "Eskimoid" base, so states the theory, that the Interior migrants built, and this cultural fusion led, eventually, to the Northwest Coast as we know it.

There is neither time nor space to state fully the Smith-Boas-Borden thesis. It is available in the references listed. As far as present University of Washington workers are concerned it has been unacceptable as *the* major broad theoretical approach to the problems of Northwestern prehistory. This rejection is not intended to be complete. We have not the slightest doubt that Borden or Smith or Drucker have found evidence of the spread of Interior traits and influences to the Coast. It would be as absurd to reject this as it would be to accept the theory of evolution-in-isolation for Coast and for Interior which Borden imputes to Caldwell (Borden 1953-54: 31) in spite of the latter's final paragraph (1953-54: 24). Both Drucker (1943: 33) and Jacobs (1931: 95-6) have described actual downriver movements, on the ethnographic level. The past must have seen similar activity.

Any single theory of culture growth which purports to synthesize for an area as great and diverse as this (extending perhaps from Cape Mendocino to Yakutat Bay plus the interior regions) must have an equally far-flung documentation. It would seem more logical to us that Borden would limit his historical reconstruction to the Fraser drainage. However, his discussions implicate the whole classic Northwest Coast and the Plateau; hence our own broad and obviously thin coverage. We are perfectly aware that Borden has called his interpretations tentative, and has spoken of them as best only "for the time being." We realize that he will examine the problem in all of its aspects when he publishes on his excavations but we feel that it would be wise for us to

* This article, in preliminary form, was discussed by Borden, the authors, and others at an impromtu symposium held after the Northwest Anthropological Conference, in Seattle, May, 1955. The preliminary draft was given to Borden. A copy of a near-final draft was sent to Borden during the summer of 1955, in order that he might comment and use it in preparing an answer. A copy was also sent to Frederica de Laguna for her comments. We are grateful to Borden for his candid comments and, also, for suggestions which resulted in the illumination of some of our more obscure phrases. De Laguna sent a long letter which was of great aid and interest and referred us to a recent manuscript, a copy of which was loaned to us by Catharine McClellan. We are grateful to all concerned and hope that this cooperative exploration of locally important hypotheses will be of value.

stress, here, those aspects of the problem which controvert Borden's theory, in view of the present lack of a measured pro and con discussion.

It is to be feared that what was, a few years ago, interesting and valuable speculation may become dogma. Until we have a descriptive coverage of Borden's field results, it seems wise to sound a warning to other workers, who lacking geographic propinquity or special interests, might not be archaeologically cognizant of such a large and complex area — one which has yielded only a single modern published site report (King 1950). Therefore, we shall select a few of the mainstay traits of the theory, as listed by Borden, and examine them briefly, pro and con and one by one.

In 1951 Borden summarized his thinking and some of the results of his excavations. He offered the following sequence for the Fraser Delta area: *Early period* (Eskimoid cultures) including Locarno Beach I and II and Whalen I; *Intermediate period* (Interior cultures in a state of transition) including Marpole, Point Grey, Locarno Beach III, and Whalen II; *Late period* (developed southern aspect of the Northwest Coast culture) including Stelax village at Musquem and other late prehistoric and historic sites.

It is the Intermediate period and the explicit Interior controlling influences on coastal culture change that we wish to discuss. In doing this, problems concerning other aspects of the sequence will come to light.

Borden's (1951: 45) traits which he labels Interior and which, he states, became effective on the coast in the Intermediate period are:

> Barbed antler harpoons with tang and lateral line guards.
>
> Barbed fixed projectile points of antler.
>
> Emphasis on stone chipping with chipped scrapers, knives, and projectile points, particularly points of complicated outline.
>
> Massive stone carving.
>
> Heavy-duty woodworking tools, including large antler wedges, pestle-shaped stone hammers, large adze blades of nephrite and serpentine.

These, then, are the items which we must attempt to evaluate.

Barbed harpoons. Caldwell (1953-54: 23) did not find barbed harpoons with tang and lateral line guards in the Okanagan-Similkameen area of the southern Fraser Plateau.* He further points out their numerical insignificance elsewhere in the Plateau. Borden has argued that lack of these antler or bone harpoons or of the fixed antler points in the survey area may well be due to the accidents of preservation; few or no other small items were found (Caldwell 1953-54: 19). On the other hand, antler wedges were recorded, and wedges, because of the rough, battering usage received, fragment and decay more rapidly than the polished pieces. The only indubitable and completely Plateau archaeological occurrences of this harpoon type of which we are aware are: Site 46, upper Columbia (Collier, Hudson, and Ford 1942: 52, 53, 79, Pl. 9 i), four from the Lytton area in the British Columbia Provincial Museum, and one example from the Shuswap area (Williams Lake) (Borden 1953-54: 29). Site 46 in the upper Columbia is probably immediately prehistoric while the Lytton area lies in a region which we judge to have received strong, late coastal influences. There are no further data regarding the Williams Lake specimen. At any rate the few finds do not suggest to us that this artifact represents a regular Interior culture trait.

Borden contends (1953-54: 29) that since the harpoon with lateral line guard is found *only* in his Intermediate period, the examples found in the Interior "cannot be attributed to late influences from the coast. On the contrary, such harpoons appear to be survivals from an early Interior culture base." Yet it is significant that none of the many River Basin Survey excavations in the McNary Reservoir (Osborne 1951), Chief Joseph Reservoir (Osborne, Crabtree, and Bryan 1952), Equalizing Reservoir (Mills and Osborne 1952), O'Sullivan Reservoir (Daugherty 1952), nor the Vantage Cave excavations, have yielded the artifact. Borden admits the evidence to be scanty and attempts to buttress his position by adding an example from "interior dwelling Gitkisan of the Upper Skeena" (Drucker 1943: 126, Table 8) and another from the Portland-Vancouver area (Borden 1953-54: 29). In the latter examples, at least, Borden is obviously relying upon geographic rather than upon cultural criteria for differentiating Coast from

* This field work was supported by a grant from the Agnes H. Anderson fund, University of Washington, to Douglas Osborne, who directed the work.

Interior. The Gitkisan can well be considered coastal, culturally. The harpoon point noted from Portland-Vancouver was collected from site CO-7 (Strong 1955: 4, Fig. 6) on Sauvies Island, historically a Clackamas (Chinook) area, by a local amateur. There is much reason to consider the Chinook Coastal rather than Interior. From a strictly geographic viewpoint, CO-7 lies 90 miles below the inland termination of tidewater and is not far removed from the estuarian development of the Columbia mouth. Interestingly, this site was occupied during the historic period, thus setting nicely at rest Borden's contention that such implements could not have derived from the coast in late times — unless, of course, it had an ancient occupation as well.

Although extensive data from the Lower Columbia are lacking, inferential interpolations from the stratified site of Wakemap, near The Dalles of the Columbia, suggest a close relationship between the Interior and the downriver coastal sites. If such harpoons had derived from the Plateau they might be expected in the deep deposits at The Dalles. They have not been found there. Ray (1942: 112) did not find the type in the ethnographic Plateau. The intriguing bits of information given by Steward (1943: 270) for the Northern Shoshone might be of importance to this question if they could be amplified. It would seem that the Northern Shoshone may have used harpoon points related to Borden's type. Of probably greater import in the present context is the material illustrated by Jochelson (1925, Pls. 24, 25) and that found by Laughlin and his coworkers in the Aleutians on Umnak Island, at Nikolski. Although the final Nikolski report is not yet printed, and no time comparisons can be made, the data and photographs appearing in Laughlin and Marsh (1951) definitely indicate that probably typological-functional relatives of the simple self-harpoon with line guards were found from the bottom (with a radiocarbon date of over 3000 years ago) to near the top of the mound. In this connection the probably older Kachemak Bay I materials should be consulted (de Laguna 1934). When one considers that Borden originally called his lower levels Eskimoid, with a full realization of all implications, it would seem that this northern and coastal occurrence would almost dispose of the Coastal or Interior question for the artifact. De Laguna and others (1955: 284-5) have, along the same lines, pointed out that Borden's harpoon (?) as illustrated (1951, Pl. 1, 5) appears to be similar to certain Yakutat Bay types and, inferentially, should be considered as an indication of coastal relationship. They add, speaking of the type which Borden has stated to be diagnostic of Coastal-Interior relationships: "The detachable barbed head in this area does not have to be attributed to the interior specifically. In view of its undoubtedly great antiquity in Southwestern Alaska, it is probably very old on the Northwest Coast also, and can be described as 'Eskimoid' with as great justice as can the socketed harpoon heads." All in all, one wonders at the statement: "The far-flung distribution of this harpoon type in the Interior and the evidently restricted distribution on the Coast point to an Interior origin" (Borden 1953-54: 29). Above all, it seems strange that Interior people should bring harpoons to the coast.

It is our understanding that Borden will accept, as pertinent to this discussion, only those harpoon points of the exact form (Collier, Hudson, and Ford 1942, Pl. 9 *i*) made of antler, such as he has described. On the other hand our typologic outlook, which includes functional data insofar as these are available, plus a consideration of the ethnographic factors, will not permit us to view such a classificatory checkrein as necessary.

Antler Projectile Points. Less can be said of barbed fixed projectile points of antler. This trait was lacking in the Interior sites excavated by University of Washington workers. On the other hand such projectile points of bone and antler were in use among the Eskimo and along the coast into the ethnographic period. With this in mind, we find it difficult to see the type as an interior development. L. R. Collins' (1951: 141-5) information from the essentially Plateau Kalapuya (Willamette Valley) area indicates a lack of bone tools in the valley except near the Columbia, in the region of Coastal, upriver influence.

Stone Chipping. Obviously there has been a great emphasis on stone chipping in the Plateau-Interior. Ground stone points are rare, although they are found. So far we have looked upon them as trade items — rightly or wrongly. Borden (1953-54: 28) states: "My contention that certain Fraser Delta assemblages are

markedly Interior in character is based in considerable part on the strong emphasis in these particular cultures on stone chipping for projectile-points, knives, scrapers, etc., as well as on typological similarities existing between Coast and Interior specimens." It is up to Borden to demonstrate the typological similarities that may exist between the Fraser Delta and the Fraser-Thompson upstream hinterland which, we presume, is his Interior. Lacking as we do any knowledge of the items from the Fraser Delta such a study is impossible for us. A demonstration of typological similarity would be rather convincing evidence for his thesis although a similar situation must be shown to exist elsewhere before his hypothesis can be given general credence throughout the Northwest. Also, it should be noted here that we are prone to look upon the Thompson area as one which received later prehistoric influences from the coast, a logical situation in view of the physiography. If we are correct, there was, then, a unique amalgamation of coastal and interior traits in this area and archaeological studies of material from the 2 regions must be incisive and cautious, and done with this possibility in mind.

It is also true that, as far as our excavations have illuminated the picture, the earliest occupations in the Washington Plateau lack the emphasis upon stone chipping, both quantitatively and qualitatively, that is present in later manifestations. We apologize that these data are still in our field notes and typescripts. Furthermore it must be pointed out that many of the Plateau and Coastal point types have a wide extra-local distribution. King (1950: 18 and following) notes this point. Forms that we have particularized as distinctly Plateau (the Plateau pentagonal, the Columbia Valley basal-notched, Walula rectangular stemmed, and so on) are, as far as we are aware, not found elsewhere except as infrequent trade pieces. The absence on the coast of such certified types, as these appear to be now, indicates a lack of cultural influences of the kind that the theory under discussion postulates. Large numbers of trade pieces, if they are found, would, of course, be meaningful but stemmed points, basal or corner notching, leaf and other simple blades, lamellar blades, and so on, without an additional context, are too widespread to support local historical structuring. We do not have sufficient knowledge to comment upon the northerly Interior Athabascan areas (Borden 1952; 1953-54: 26).

A problem of some magnitude, which is absolutely untouched and which is probably germane, centers around the mouth of the Columbia in old Chinook territory. Here stone chipping was excellent and it appears to have spread coastally. Whether there is a Plateau orientation here or whether or not deep sites with sequences comparable to Borden's at the Fraser mouth exist are both questions that we cannot answer.

Massive Stone Carving. This item is perhaps the least worthy of comment at our present state of knowledge. We even suspect that Caldwell (1953-54: 23) and Borden (1953-54: 29) are not talking about the same thing. There can be no doubt that stone sculptures of various types are found throughout the Plateau area; pestles, mallet-pestles (mauls), clubs, and mortars or bowls have all been found. These items were sometimes elaborated decoratively. This sort of thing is different, or seems different at present, from a stylized and sophisticated stone carving art.

Here we must pause to point out, again, that it is not stone carving per se that should interest us. Stone carving (that is, pecking, abrading, crumbling, sawing) continuity could probably be established with no great gaps for continental distances but it is doubtful if such a demonstration would have significance. Hence, unless we can be furnished with a stylistic analysis we must reject the propriety of drawing the Basin carvings into the question (Borden 1953-54: 29; Drucker 1943: 128), although we do feel that a mature analysis of North Basin versus Plateau culture would be of immense value. The distribution of stone carvings in the southern Plateau extends no farther east than the McNary area (and we emphasize that we are lumping many and varied objects here), probably only peripherally beyond the John Day-Columbia confluence area, and little north beyond the Yakima Valley. Intensive abrading and grinding of stone tools, neolithic techniques, obviously extend beyond these confines. Westward, contrary to Borden, carved stone has been found to the mouth of the Columbia and north into the Shoalwater (Willapa Bay)-Chinook area (Wingert 1952: 30). The lower Columbia (Chinook) area, especially the Sauvies Island region (Willamette-Columbia

confluence), seems to us to represent a center of elaboration. Certainly the "ape-heads" (Terry 1891) of the John Day confluence area are poor things when compared with some of the handsome downriver sculptures (Wingert 1952). Borden (1953-54: 30) suggests a northward extension of this southern province into the Upper Columbia and Okanagan areas. Adequate published data do not exist to connect the latter with either the Columbia or Fraser areas. In the upper Columbia the carving is of a marginal nature, restricted to pestles. In the Okanagan Caldwell did not find stone carving; subsequently a few examples, which may have been imports, have been called to Borden's attention. At best the occurrence is limited; it seems wise, therefore, to consider the Okanagan as also marginal to one or the other centers of Plateau carving. Physical contiguity with the Thompson area where carving is more frequently encountered suggests that the affiliations lie within this region. In the Fraser Valley proper, Borden notes centers of occurrence along the lower reaches of the river and extensions of the technique into the Straits of Georgia and portions of Vancouver Island (Borden 1953-54: 30). Thus a restatement of distributional patterns seems to reaffirm the downriver coastal orientation suggested by Caldwell. The question as to the relationship between the Lower Fraser and the Lower Columbia centers remains obscure. Stylistically, some features evidence seemingly close ties with elements present in southern coastal contexts (Crabtree 1952).

Frankly, we do not favor the categorization that we have been forced to use above. We feel that the context of the argument has led us all astray. We are sure that the question can better be settled by a full-fledged study of the areal art styles — carving in bone, antler, stone, soapstone, and so on, all included. One of us (Crabtree 1952) has turned a few shovelfuls but the problem has hardly been outlined, to say nothing of clarified. We can state that small soapstone carvings of the Wenatchee-Upper Columbia area that we have seen have some Northwest Coast attributes. The few carvings from this area are small, usually soapstone miniatures. One, from near Wenatchee, has 2 wolf or dog heads in line, a common coastal method of presentation. It is said to have been picked up on a site which has late attributes. So far we see no reason to place the centers of stone carving in the Interior, however patriotic we may feel. It is certainly true that there is massive stone carving among the Pacific Eskimo (lamps, and so on) as de Laguna has pointed out in a recent letter to the senior author.

Heavy-Duty Woodworking Tools. This category includes large antler wedges, pestle-shaped stone hammers (mauls), and large planing adz blades of nephrite and serpentine. Antler wedges are present in the Okanagan survey area only in very small numbers. Elsewhere in the Plateau they are always present but never numerous, possibly because of the hard usage that they received. Stone hammers or mauls may possibly have greater depth than do large adzes of homogeneous materials; woodworking may be a secondary use. Ethnographic evidence indicates an extensive and perhaps earlier use as food pounders. Large adz blades are also restricted in number and noted only from protohistoric and historic graves. The distribution suggests a coastal or exotic origin (Caldwell 1953-54: 23).

As a consequence of the failure of Caldwell's admittedly limited research to offer substantiation for his formulations Borden has attacked the validity of the survey (Borden 1953-54: 27) and has offered supplementary data in ostensible amplification of his position. He notes that smaller wedges and adz blades occur in the earliest level at the Fraser Delta but affirms the inadequacy of such implements for heavy-duty woodworking, canoe and home building, plank splitting, and the like. As a consequence he feels that the heavy implements must have come from the Interior. "I would suggest that it was the meeting of an ideal medium, like the straight-splitting, easily worked wood of the red cedar, with suitable implements which gave rise to the great woodworking industry of the Coast" (Borden 1953-54: 31). Before this Borden sees skin boats only on the coast. We will be excused, here, for wondering why these implements developed in the dry, and in many places wood-starved, Interior. As with the bone weapons we cannot suppress a carrying-coals-to-Newcastle feeling.

Borden (1953:54: 31) emphasizes great size as a significant characteristic of the Interior adz blades as opposed to the smaller forms of the Coast. While admitting that excessively long sawed adz blades (12 to 18 inches) do

occur in the northern and perhaps eastern Plateau, such blades constitute a distinct minority. The greater number of adzes in the Interior are much shorter (2 to 9 inches), but differ from the larger examples only in terms of absolute length. From a functional point of view, it might be suggested that the longer examples are far less satisfactory tools, being subject to a considerably greater rate of breakage than the shorter types. There is no assurance that the smaller forms were any less satisfactory for working or surfacing timbers than the larger. It is largely a matter of hafting and motor usage and it is hardly wise to read our own tool usages into those of a prehistoric culture. Neither the heavy splitting adzes of the Tlingit, nor the smaller ones, reached farther south than the northeastern Kwakiutl (de Laguna and others 1955: 337). Presumably the development of this tool was northern (de Laguna 1947: 279) and it was working its way south. The south never did possess the really large and heavy-duty woodworking tools. De Laguna and others (1955: 337) further point out that, "For shaping the dugout no tools larger than the small planing adz and crooked knife are used by the Tlingit." If the D-adz hafting method is ancient among the Salish one can see, in it, good reason for the preference of small adz blades. The shorter adz blade is certainly common in the archaeological sites of the southern Coast, particularly in the Straits of Georgia-Puget Sound area. Borden suggests that large adz blades were made in the Interior for export (1953-54: 31). They are, however, exceedingly rare on the Coast, the suggested area of import. Certainly celts (planing adzes) were made in the Lytton area, at least in late periods, as sandstone saws are found there. It is possible that the large blades are blanks from which smaller sections were cut although we know of no evidence to support such a suggestion. At any rate the smaller forms are the most usual coastal ones. They must have served satisfactorily there and we see no need to derive "heavy-duty" adzes from the Interior. As a matter of fact none of our earlier excavations in the American plateau has supplied us with adz blades. Present information, then, indicates that the adz blade of nephrite and related materials is a late, not old, trait in the Plateau. This Borden recognizes for the Okanagan and the Upper Columbia (1953-54: 31). In the Plateau the tools, both large and small blades, have a general but not abundant distribution. Over most of the Interior area the cross section is prevailingly angular (sawed); this also seems to be characteristic of the Southern Coast. In the southern Plateau the rare blades appear to be prevailingly elliptical in cross section.

We find it difficult to visualize the Plateau as a center of stimulation, as far as the Coast is concerned, for this tool. From the viewpoint of this region the complex of jadeite-nephrite adzes is an ancient circum-Northern-Pacific trait. Borden (1953-54: 30) admits that there were "small adze-blades, or rather chisels" on the Coast in early contexts. The basis was apparently there for further development of a woodworking industry. Why, given this, need one postulate a complex introduced from the Interior, an area that is well off the circum-Pacific diffusion highway, and an area which seems unsuitable as a developmental center, rather than accept either development in situ or development stimulated directly or indirectly by an adz-using culture, probably from the north, or both? Obviously we cannot put our finger upon such a culture, now. It is pertinent, however, that Borden's so-called Early Maritime ("Eskimoid") culture, however it is interpreted, is evidence of either circumpolar, northern, or circum-Northern-Pacific influences in the area. Perhaps the terms are, at least here, synonymous. It is further pertinent in this context that de Laguna (1947: 157), in her consideration of planing adzes, notes that they are characteristic of "almost every phase of Eskimo culture, ancient and modern. . . . They are also common in Asia. . . . Andersson has in fact shown that this type of adz goes back as far as the Neolithic Yang Shao stage of Chinese culture in Honan, which is sufficient to establish its antiquity in the North Pacific area." While in actuality many related artifact types may be subsumed under this broad treatment, still the extremely wide distribution suggests that the Plateau is a periphery.

Borden (1953-54: 31) points out: "The pestle-shaped stone hammer or hand-maul of the Pacific Northwest is almost certainly the Interior pestle or food-pounder specialized for woodworking. . . . Whether this specialization occurred in the Interior or on the Coast is not yet known, but it is certainly suggestive that the whole series of transitional forms from the cylindrical food-pounder to the fully developed

woodworking hammer with striking-head, tapering shaft, hand-flange, and nipple top is found only in the Interior." Borden is correct in noting such a formal transition in the Interior but the recovered examples from the Southern Plateau suggest that often the end product differs functionally from the Coast flanged maul. The latter is invariably a double-flanged tool with a flat striking face exerting a blow in line with the long axis of the implement. The Plateau hammer is characterized by a flange and/or nipple at the proximal extremity only. The distal portion is cylindrical rather than flange-shaped. In many cases corner fractures suggest that the lines of force were applied at right angles to the long axis of the handle in the manner of a sculptor's mallet. Osborne (1951) coined the cumbersome term mallet-pestle for this implement. This evident difference does not, of course, invalidate Borden's projected relationship. The coastal maul may well have developed from interior prototypes (coastal forms are known in the Interior) but in the Interior it was probably basically a food pounder. Ray (1942: 143, 146) lists the item in both his "utensils" and "implements" categories. Primary use as a woodworking tool can only be demonstrated on the Coast. It may be of further significance that in the recently excavated sites in the Plateau, the developed nipple-topped pounder seems to be late. It occurs frequently in historical contexts (Osborne 1951).

The antler wedge is both old and widespread in the Plateau and elsewhere. Bone wedges are ancient and indigenous among Eskimo, the Eastern Woodlands, and the Northern Plains. Birket-Smith ascribes them to his Ice-hunting horizons: "The justice of this conclusion has been supported archaeologically by occurrence of the bone wedge in the Ipiutak, Old Bering Sea, Punuk, Birnirk, Kachemak Bay I, and Dorset Eskimo cultures" (de Laguna, 1947: 169). It is of interest that Beardsley (1954: 35) finds that, "perhaps the use of large whalebone wedges is . . . late" for the San Francisco area.

The trait is thus a moderately old one in northwestern North America. Borden has included it as "Interior" in origin only because it has occurred in the postulated "Interior" context of the Intermediate phase of the Fraser Delta. In itself it seems to possess little diagnostic value in delineating an interior origin for woodworking.

Lest we be accused of a completely one-sided stand we hasten to point out that there is at least one trait which we believe to have trended from Interior to Coast. That is the complex which eventually resulted in Salish weaving with its reverse-ring warping and 2-roller loom. As of now the best possibility for a close relative and probable progenitor of this cultural elaboration lies in the frame-woven fur strip blankets of the Interior. Work underway by Carolyn Osborne and Joanne Hirabayashi will clarify and elaborate the problem within the next few years. How this ostensible diffusion fits into the broader picture and into the chronology we do not know. It is probably late.

SPECULATIONS

Let it not be thought that, because of our stand, we take either the viewpoint that the present is no time for syntheses and theoretic interpretations or that we look upon the Plateau as a dutiful hinterland of the Coast. On the other hand, it is obvious that here if anywhere we need hypotheses which at once will guide us in our researches and which are susceptible to testing in the field. The interpretation which Borden has elaborated and which we have discussed briefly above is such an hypothesis and we hope that some of the methods of studying it are implicit in our paper. Any hypothesis can become stultifying, however, if it is accepted rather than tested and if it is defended rather than examined. There are other hypotheses which should be tested against present and future accumulations of knowledge. The few speculations that follow may be useful in the future.

In spite of the fact that Coast and Plateau are separated by a range of mountains, the commerce between the two was important recently and was probably similarly great in older periods. In general, it followed the rivers which at once pierced the barrier and offered inducement to movement. Because of the recent River Basin Survey activity our excavation has been primarily along these rivers. We thus feel that our Plateau work has been strongly one-sided. However, even though we have not devoted much time to extravalley archaeology we have been alive to its importance. Finds from both open and cave sites, primarily in river valleys, seem to emphasize an ancient hunting-gathering economy which is not pri-

marily river oriented. This possibility has not yet been tested by extensive digging. A Great Basin relationship or slant has often been discussed in this connection. King (1950: 12) interprets his data in a similar manner. His Island phase is land oriented and his suggestions as to basic situation have been validated by later work (Carlson 1954). Unfortunately none of the earlier sites, either coastal or interior, are sufficiently ancient that they can be connected culturally with the early man site reported on by Daugherty (1951). It is strange, and intriguing, that neither of these early manifestations appear to have been truly water oriented, if we can judge them on the present evidence. We are, of course, excluding Borden's distinct Early Maritime (Eskimoid) from this statement; we lack wholesale data on that culture. It is also of interest that chipping in basalt, generally points and blades of noncomplex outlines, seems to have characterized these older levels on both the Coast (King 1950: 18) and in the Interior. Also of interest is the fact that crude pebble choppers occur in some older levels on the Coast and widely in the Interior. These data may be indicative of a certain older cultural uniformity on both sides of the mountains. Specialization to a marine environment plus cultural elements from the North brought about great changes on the Coast. Partial dependence upon the big river, the Columbia, probably resulted in far lesser changes in the Interior. Intercourse between the 2 areas never ceased and we have certain similarities in the material cultures, some of which have been mentioned, to prove it. Great changes in the nonmaterial culture were brought about, especially on the Coast, perhaps partly by the diffusion of values and basic philosophies along the rim of the Pacific, and partly by the amount of leisure time available on the well-fed Coast. We fail to see, therefore, why a land-oriented culture on the Coast and along Puget Sound should be interpreted as of Interior origin. After all, everywhere, one must expect adaptation to maritime living, some form of specialization along the various lines offered by the sea. An island phase, to use King's term (1950), must have been early on the Coast, unless a maritime culture arrived full-blown. The local sea culture had to develop locally from a land-oriented one or at least from peoples who had traveled along and knew the Coast. There does not seem to be a need to postulate a primary diffusion from the Interior.

We have barely mentioned the Great Basin and the South. It has often been discussed when we have mapped archaeologic campaigns. Certainly the early Plateau, if we are correct in visualizing it as once far less river-dependent than it was in ethnographic times, must have had a Basin air about it. The archaeologic hiatus is so marked in the Northern Basin and along the eastern front of the Oregon Mountains and in Northern California that it seems valueless to do more than point out the problems.

To the North and on the Coast the situation is similar. Drucker's and Beardsley's exemplary survey of the Northwest Coast yielded no evidence of much antiquity (Drucker 1943: 112-3, 127), yet Borden's finds have demonstrated that sites of considerable age must exist between the Aleutians and the Fraser Delta; he has stated, in conversation, that such do exist.

Unfortunately we do not, yet, have the skeletal material available to feed that important category of information into the problem. Smith (1907: 187-90, 354) states that dolichocephaly was characteristic of the older population on the Coast and that bracheycephaly is later. It is possible that poor preservation and deformation have obscured the facts. We are mindful of a similar long-cherished belief, that of a wholesale replacement of dolichocephals by brachycephals in the Southwest, which was finally found to be generally invalid (Seltzer 1944). Borden has pointed out, in conversation, that Smith's statements rest upon very few and decayed skeletons.

In 1948 a small skeletal series was sent by Osborne from the McNary Reservoir near Umatilla, Oregon, to the U.S. National Museum where it was studied by Marshall T. Newman. As an aspect of his study Newman examined the most important cultural attribute of the series, deformation, historically and ethnographically. Osborne did the same work independently as part of the general examination of the cultural attributes of the site. It is probably significant that both workers came to the same conclusions: that skull deformation was a definite downriver, perhaps coastal, trait which was working its way upriver into the

Interior (Osborne 1951). The present writers feel now that this is but one aspect of a late eastward cultural trend or influence.

It is unfortunate that, in spite of the several sites excavated on the Coast, and the known profound change in feeding habits of the people from the oldest times toward the more recent, we have no rigorous studies, published or otherwise available, of the food remains in the excavated middens. Methods for such study have not been worked out in the area. It has been impossible, in at least 2 instances, to get marine mammal bone identifications. Nonetheless, all workers have noted that diet changes are recorded in their sites. King (1950: 78) found the early, Island, phase possibly more dependent upon land mammals than upon food from the sea. The same has been noted by others in the area and in adjacent sections (Carlson 1954). Borden, writing of his Whalen Farm, the Intermediate period (1950: 19, 24), points out that the lower levels (Whalen I, late Early Maritime) at the site were characterized, among other things, by deposits of mussels and levels of cockle shells (*Mytilus edulis* and *Cardium corbis* or, as the cockle shell is now called, *Clinocardium nuttallii*). Whalen II was ushered in by a change in shellfish remains: "The mussel deposit is suddenly overlaid by thick layers of large clams, such as *Schizothaerus giganteus* and *Saxidomus giganteus*, although mussels do not disappear entirely. This sudden change in diet coincides with an equally abrupt change in the artifact assemblage. . . ." The point here is this, and this is one of the many aspects of the hypothesis that Borden defends which seems awry, that the large clams must be dug; Borden makes this point himself. This implies an acquaintanceship with seaside living; it is a trait of coastally-oriented and sophisticated peoples, not a trait which one would associate with a people recently arrived on the coast who had strong ties with the interior Plateau (Borden 1950: 24). If we must have migrations, this episode seems to us much more like one of coastal migration. It could as well represent diffusion and local population shifts as Borden suggests (1950: 24).

One question, with its ramifications, remains to be posed and discussed. That revolves around Borden's Early Maritime culture. Certainly there is a possibility that Borden's earlier term, Eskimoid, may have had a proper implication. If the Early Maritime culture is as seaward oriented as it appears to be, it is indeed possible that there is a long range and attenuated but actual relationship with Okvik or Paleo-Aleut, or perhaps better with Kachemak Bay I, in Borden's oldest Fraser Delta material. Borden's radiocarbon date is close to that of Okvik (early Old Bering Sea) though 800 or 900 years more recent than the oldest of Laughlin's Paleo-Aleut Umnak levels. We see this as a possibility, with the proviso that we have no more than Borden's few summaries to go on. If we accept, then, that there is a genuine example of an ancient aspect of circumpolar culture in the Fraser area, we find it necessary to stress immediately that this does not preclude trait congeries that might appear superficially to be interior or inland in their facies. The chipped stone of Ipiutak is famous. The early Eskimo cultures, Old Bering Sea, Kachemak Bay, Aleutian, all had an abundance of chipped stone. The later ones, however, seemed to shift to the use of ground slate weapons (H. D. Collins 1951: 436). Therefore, given a truly northern circumpolar or Eskimo cultural relationship one would almost predict that there would be a developed use of chipped stone in evidence if the material were early — and Borden's is early: 2430 $\pm$ 163 years. (Borden 1953-54: 26). Borden does have qualitatively advanced but not abundant chipped stone in the Early Maritime. Too, given the preceeding few statements we would, again on the basis of the northern developments, predict a substitution of the rubbed slate implements in the south in the later periods as happened farther north. This, of course, is what we have, at least in the Puget Sound area. Looked at in this manner, then, the local sequences appear as a part of the Alaskan or, better and more probably, a peripheral part of the Northern Pacific picture. We are not the first to make such a statement. Led by a consideration of art styles, de Laguna (1947: 264) pointed out "an ancient substratum underlying Eskimo art, a substratum which we must extend into the Salish area." In spite of the immediately foregoing lists of evidence and speculation we are not prepared to look upon Northwest Coast culture, early or developed, as a simple aspect of a northern circum-Pacific drift. There has been great and amazing local culture growth, but there does exist a good reason to suggest that some of our basic local coastal development is in line with and possibly part and

parcel of much that has gone on farther north. This, we shall be the first to point out, may not be much or any farther from hypothesis than is the theory that we have found it necessary to attack.

Again, not to seem provincial, we wish to point up another and really serious aspect of the problem. Ritchie (1951a; 1951b: 131) has pointed out that the Laurentian phase in the Northeast, with its strongly developed transboreal traits, ground slate blades, ulus, and so on, is earlier than the closest northern, Arctic culture, the Dorset, whence it was at one time supposed to have evolved. This means that an old circumpolar type of culture pattern, in the possession of the Indians, existed most anciently in our Northeast (Lamoka Lake, 5383 ± 250 B.P.). It would seem to have been a major aspect of the circumpolar pattern in which the later Eskimo, Dorset, and many others all found their own areal and ecological specializations. Now it is true that the question of the probability of an ancient basic, almost continent-wide culture, has been raised many times. We do not mean to suggest a similarity going back to the immediately post-Bering Strait period but to a time of developing cultures including most of the Archaic (as in Eastern and Southeastern United States) levels. A time scale on the order of from 6000 B.P. to about the time of Christ would seem reasonable. Beardsley nods in this direction (1945: 103-4) from his Bay region coastal sites in California. To us the problem is very real. The postulated relationship of the Wakashan language to Algonquin, if shown to be valid, would be most provocative of further consideration in such a connection. Other aspects of the situation might be fur-strip weaving, the 3-bar weaving frame, use and carving of cedar, wood dishes and spoons, mat coverings for houses and so on; all of these traits, with others, might be reflections of the old Archaic-Woodland-circumpolar cultural base of which Borden's earliest and Ritchie's earliest may be the extremes. Evaluation of these suggestions has not been made, at least by us, and this is not the place for such an undertaking. There are, thus, vague but persistent complexes such as the linguistic, the old ground slate, and the circumpolar cultural relationships, and certain ethnographic traits which all suggest a deep and real relationship across the northern-central part of the continent. It seems only logical to us to point this out and, in doing so, to raise the question, again, of the antecedents of Borden's Early Maritime ("Eskimoid") culture. Has he here a relative of the ancient Eskimo, for example, or has he rather a part of the circumpolar pattern to which the ancient Eskimo belongs culturally, but which was spread south, east, and inland before or during the coming or development (see Chard 1955) of Eskimos?

Addendum. This paper was written before Drucker's 1955 paper appeared. It is of interest that there are conceptual convergences in the 2 papers, written, as they are from a narrower and a broader base, respectively. We believe the two should be read at one sitting.

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THE CULTURAL POSITION OF THE BAHAMAS IN CARIBBEAN ARCHAEOLOGY *

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THIS paper is concerned with the prehistory of the Bahama Islands, British West Indies, an archipelago stretching in a 600-mile arc from the southeast Florida coast opposite West Palm Beach to within 60 miles of the northern coasts of Cuba and Hispaniola (Fig. 1). The Turks and Caicos groups, although politically administered from Jamaica, belong both geologically and archaeologically in the archipelago and are therefore included in this report.

The purpose of the present survey is to clarify the relationships of pre-Columbian Bahamian culture to neighboring regions. Before any clarification can be made, however, it is first necessary to outline briefly the archaeological findings in the islands, for no complete survey has yet been published. The writer is currently preparing such a survey based upon as extensive historical, ethnographic, and archaeological information as possible (Granberry 1955a), but for the purposes of this report the few statements made should suffice.

Little archaeological work has been done in the Bahamas. There has been almost no interest on the part of local inhabitants in the prehistory of their islands, and archaeologists from outside have usually been limited in their work by time factors. This, combined with the difficulty of reaching many of the islands without great expense, has meant a lack of thorough site surveys and excavations. Provided ample time did present itself and finances were forthcoming the task of conducting a survey would still be no simple one, for the majority of sites located so far have been in caves, with which most islands are literally riddled. Many of these caves have been dug for their rich deposits of cave-earth, used as fertilizer, making the chances of finding a rewarding site very slim indeed.

Eight surveys, however, have been conducted: one in 1887 by W. K. Brooks (1888), one in 1912 by Theodore De Booy (1912, 1913), one in 1934 by Froelich Rainey (1934, 1940, 1941), two in 1936-37 and 1947 by Herbert W. Krieger (1937; Smithsonian Institution 1938, 1948), two by John M. Goggin (1939) in 1937 and 1952, and one by the present author in 1955 (1955b). So far as is known the only actual excavations undertaken were those at Gordon Hill Caves on Crooked Island by Rainey (1934: 20-2; 1940: 152) and several in the central islands by Krieger (Smithsonian Institution 1938: 28-9; 1948: 16-17). Nevertheless, adequate surface collections were made in most of the major islands, and these, in conjunction with smaller collections in Nassau, the United States, Britain, and Europe, furnish enough material to make a tentative statement on the archaeology of the islands possible.

A total of 61 major sites has been located. Many, however, are represented by only a few specimens and consequently give little satisfac-

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tion when treated singly. It is only through a composite examination of all the sites that any cultural reconstruction can be attempted. Even then, because of the general paucity of specimens and lack of documented excavations, the picture as presented here is undeniably a partial one.

Of the 61 major sites only 16 represent open villages. The remaining are all cave sites, either burial, habitation, or petroglyph. Productive sites are concentrated in the Caicos rather than farther to the north, and 15 of the village sites are found here. This concentration is presumably a result both of denser prehistoric population and of more thorough archaeological work in the southern islands than in the north. It was in the Turks and Caicos that De Booy conducted the bulk of his research in 1912 for the Museum of the American Indian. All areas of the archipelago have been surveyed cursorily for sites except the Exuma chain, Great Exuma, the Jumento Cays, and the Anguila Isles.

Ceramic and nonceramic specimens recovered from Bahamian sites show marked similarities to artifacts from north Haiti as defined by Rouse (1941: 54-91, 113-40, Pls. 7-24, 27-34). This is particularly true of stone celt types and the 2 predominant ceramic styles, which have accordingly been called Meillac and Carrier as on mainland Haiti.

The typical reconstructed Meillac specimen from the Bahamas is a vessel, probably a bowl, of moderate size with a large aperture. It seems to have been round or boat-shaped. The bottom contours are unknown. The bowl sometimes bears a red clay slip, and the walls are thick and only moderately polished. The surface of the vessel is hard, and there may be a narrow shoulder, turning not far below the lip. The lip itself is either round with a straight rim or beveled with a slightly flaring rim. The surface is usually not decorated, though in some instances it may have an incised design on the shoulder just below the lip, usually a crosshatch design which extends around the

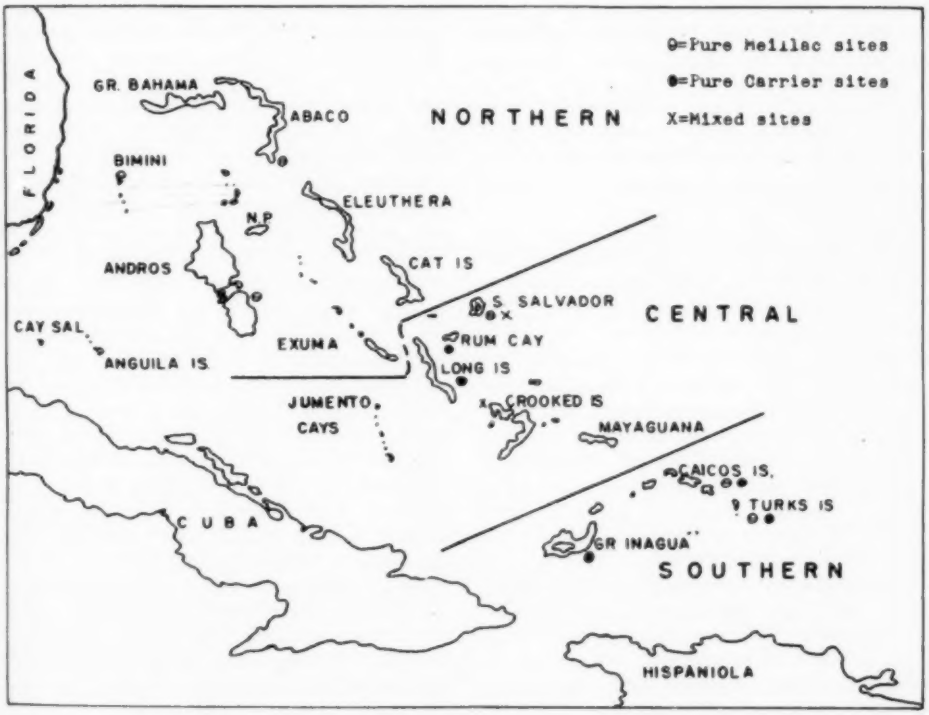

FIG. 1. Distribution of pure and mixed sites in the Bahamas, Turks, and Caicos.

vessel. Occasionally lugs in the form of an animal's face occur on opposite ends of the vessel. All but a few of the specimens bear signs of use as cooking pottery.

The typical reconstructed Carrier specimen from the Bahamas, again cooking pottery, is a thick-walled bowl, the exact body shape and bottom form of which are uncertain. It is, however, probably round or boat-shaped. The surface is soft in comparison with Meillac pottery. Lips are round, and shoulders rarely occur. Decoration, which is rare, is usually curvilinear rather than straight line as on Meillac specimens. Zoomorphic head lugs representing the features of a bat are common, usually on both ends of the vessel. Carrier specimens never have a slip. On the whole these sherds are of a finer quality of material and workmanship than are Meillac sherds.

The Ostiones-like ceramic material present in the Anadel and San Juan sites in the Dominican Republic (Rouse 1951: 256), in early Meillac sites in Haiti (Rouse 1941: 18-25, Pl. 25), and coexistent with Meillac in Jamaica (DeWolf 1953: 237), does not occur in the Bahamas. There are, however, 4 additional distinctive styles from the Bahamas. None can be placed as a substyle of Bahamian Meillac or Bahamian Carrier, and only two can be adequately described at the present stage of research. One is defined from numerous body sherds from the central and southern islands. They are probably from round bowls and are crudely made, soft, and friable. They are characterized by fabric impressions from a twined material. The style is well represented and, in the Caribbean, is unique to the Bahamas. The other style is represented by only 5 rim sherds, all quite large, from the Caicos. They are very hard, heavily grit tempered with quartz particles, and represent large vessels, round in shape with large apertures, outflaring rims, and rounded lips. All the sherds are decorated by bold incision, which superficially resembles paddle stamping. Designs are geometric, consisting of intricate combinations of straight and wavy lines. Neither of these styles has any obvious affiliation with neighboring regions.

The Bahamian Meillac and Bahamian Carrier styles seem to be areal variations of those styles in north Haiti, and the majority of cultural contact was certainly with that region. In fact, direct trade between the 2 areas is highly probable, for most stone artifacts so far recovered are made from igneous rock, occurring in Haiti but not in the Bahamas, and ceramic specimens from the Turks and Caicos are tempered with particles of quartz, which is not found in the islands. The presence of stone effigy celts, *zemis* or spirit images of stone and wood, and *duhos* or wooden stools strengthens the likelihood that Bahamian culture patterns were of Haitian origin, for all were characteristic of north Haiti (Rouse 1948: 535-6). It seems without doubt, therefore, that they were also Arawak in nature. Columbus' statement that the speech of the Lucayans, as the natives of the Bahamas were called, was understood in Arawak-speaking Cuba and Hispaniola gives us further reason to assume an Arawak origin and content of Bahamian culture (Columbus 1893: 42-3, 46, 52, 64 and following). The accounts of early Spanish chroniclers bear out these similarities (Las Casas 1877 Vol. 1: 222-32; Anghiera 1944: 501-14).

There are a few indications of cultural affiliation with Cuba. While the Bahamian Meillac is much more like the Haitian style of the same name, it does in some instances bear strong resemblance to Cuban styles in decorative motif, particularly to the Baní of eastern and central Cuba (Rouse 1942: 164) and to a similar unnamed style from the Cayo Ocampo and Cantabria sites near Cienfuegos in south-central Cuba (Morales Patiño 1947: 122).

Suggestions of connection between Bahamian culture and cultures of the Southeastern United States, particularly Florida, at present seem unfounded. Much has been made in the past of Anghiera's statement (1944: 501) that the Florida Indians visited the Bahamas to hunt doves and of the fact that both the Florida Indians and the Lucayans exhibited artificially deformed crania (Brooks 1888: 215-22; Gower 1927: 30), but these factors in themselves are hardly conclusive enough to warrant the theory that the 2 areas were *culturally* affiliated. The unfortunately stressed similarity of carved designs on some Bahamian duhos to paddle-stamped designs on Southeastern pottery types, discussed by Holmes (1894: 73-4), is not very close and, again, is not conclusive evidence. General similarities between Southeastern paddle-stamped specimens bearing a check design and the fabric-impressed sherds from the central and southern Bahamas are much too vague to propose any link between the 2 styles. To this writer the only plausible indication of

cultural connection between the Bahamas and the mainland of North America is the occasional resemblance in decorative motif of several Meillac sherds from the southern Bahamas and some sherds of Surfside Incised from south Florida (Goggin and Sommer 1949, Pl. 3 *a-e*; Rouse 1949: 131, Fig. 8). The likenesses mentioned here pertain primarily to form — boat-shaped vessels with wedge-shaped lugs on each end — and seem more basic to style definition than those discussed by Holmes. Even these postulated connections, however, are very general, and much more excavation in the Bahamas and comparative examination of specimens from south Florida and the islands is called for before a positive statement can be made. The major cultural affiliations of Bahamian culture were with north Haiti; beyond that point it would be hazardous to go at present.

An examination of sites and artifacts from the viewpoint of distribution in space (Fig. 1) brings to light 2 immediately discernible facts. One is the unusual spacing of ceramic styles in the archipelago; the second the distribution of pure and mixed sites defined from ceramic content.

Nonceramic artifacts of all types are widely dispersed. Ceramic specimens, on the other hand, show a definite scheme. Meillac sherds are found from Great Abaco south through Grand Turk, while Carrier specimens are found only as far north as San Salvador, Rum Cay, and Long Island. The divergent styles mentioned earlier occur only as far north as San Salvador. Furthermore, the southern and central islands are characterized by the presence of cave petroglyphs, monolithic axes, duhos, and a great many zemis, which are relatively infrequent farther north. The irregular stone hammer-grinder seems to be limited to the northern islands down to Eleuthera.

The northern islands from Grand Bahama south to Eleuthera and Andros, perhaps as far as Cat Island and Great Exuma, have only the Meillac style of pottery. From San Salvador, Rum Cay, and Long Island south through Grand Turk both Meillac and Carrier specimens, as well as several unique styles, are found. The over-all quality of the pottery from the southern islands is superior to that from the central and northern islands, and ceramic speci-

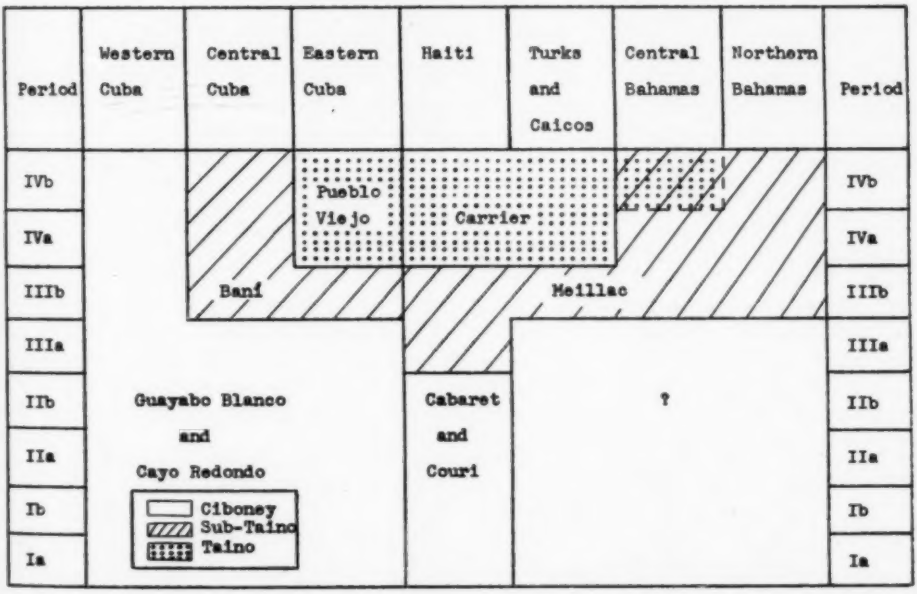

FIG. 2. Distribution of cultures, ceramic styles, and preceramic phases in the Bahamas, Turks, Caicos, and neighboring regions, through time (after Rouse 1951: 251).

mens of all styles from the southern portion of the archipelago exhibit the most complex decorative techniques and motifs.

Examination of pure and mixed sites, referring to Meillac and Carrier styles, is rewarding. As mentioned above pure Meillac sites, and only Meillac sites, are found from Great Abaco south to Andros. From San Salvador, Rum Cay, and Long Island south to but not including Great Inagua and the Turks and Caicos, pure sites of both Meillac and Carrier are found, as well as mixed sites containing specimens of both styles. On Great Inagua and in the Turks and Caicos no mixed sites are found, but both pure Meillac and pure Carrier sites occur.

From this spatial examination of sites and artifacts we may postulate the following division of the area without reference to temporal complexes. The islands from Grand Bahama and Great Abaco south, probably including Great Exuma and Cat Island, may be called a *Northern* subarea. The Meillac style was apparently in continuous occupation until the extinction of the Lucayans in the early and middle 1500's. The area is also characterized by a paucity of ceremonial objects and the absence of petroglyphs. The islands from San Salvador, Rum Cay, and Long Island south to Great Inagua and the Turks and Caicos may be called a *Central* or *Transitional* subarea. The Meillac style was in occupation for some time, but Carrier influence was beginning to make itself felt by the time of European intervention. In a very few cases the Meillac style seems to have been replaced by the Carrier, but usually, as at the Gordon Hill site on Crooked Island, both styles were coexistant or closely followed one by the other in the same site. The subarea is characterized not only by a basic Meillac style with Carrier enchroachment, but also by the presence of ceremonial objects and petroglyphs. Great Inagua and the Turks and Caicos constitute a *Southern* subarea. The Meillac style was replaced almost in toto by the Carrier at some time not long before European movement into the region. All sites are pure sites, and both Meillac and Carrier styles are represented. The area is also characterized by the presence of many ceremonial objects and of petroglyphs.

A further distinction can be made among these 3 subareas. In the Northern area only cave sites are known, both burial and habitation. In the Central area cave sites (burial, habitation, and petroglyph) and open village sites occur, the former predominating. In the Southern area the majority of sites are open villages, although cave sites are found. Furthermore, cave sites in the northern islands are primarily habitation sites, while those in the central and southern islands were generally used for burials or as "shrines," the latter being characterized by petroglyphs.

No preceramic sites are known in the Bahamas. Indications of Ciboney, or at least pre-Arawak, occupation, however, are present in the form of shell gouges, shell middens reported from the northern islands by Krieger (1937: 98), and, possibly, undeformed crania, again from the northern islands. The latter specimens are reported to have been sent to the American Museum of Natural History from the Smith Hill Cave site on south Andros (Goggin 1952 field notes: 7-8), but were apparently never received (Harry L. Shapiro, personal communication). These indications are obviously speculative. In June, 1955, the author made a reconnaissance survey of North and South Bimini in the hopes of clarifying the question of pre-Arawak occupation, but no sites were located (Granberry 1955b). It seems quite possible that an investigation of all the islands lying closest to Florida and Cuba may reveal more information.

Since Bahamian culture was derivative from north Haiti, and since there are no definite preceramic or pre-Arawak sites in the islands, we may assume for the present that they were first settled by Arawak peoples in Period III in Antillean archaeology, as defined by Rouse (1951: 251). This period represents the first appearance of pottery in north Haiti and saw the emergence there of the Meillac style (Fig. 2). It has not been assumed that this style spread immediately to the Bahamas, but rather, as in the case of Cuba, during the middle of Period III, called IIIb by Rouse (1951: 251). The reasons for this assumption are the comparative infrequency of a red slip on the Bahamian Meillac sherds, the absence of any coloring matter in the paste of these sherds, and the presence of incised lines on outside ridges, all characteristics of the late Meillac in Haiti (Rouse 1939, Chart 6). The complete absence of any Ostiones-like sherds, frequently coexisting with early Meillac in Haiti and Jamaica, may strengthen this suggestion. The

Meillac style spread throughout the entire archipelago, since specimens are found from Great Abaco to Grand Turk.

In Period IVa the Meillac style was largely replaced by the Carrier in north Haiti (Rouse 1951: 251), the latter spreading relatively soon to the Turks and Caicos, where it must have been well established by the time of Spanish arrival in the New World, judging from the frequency of Carrier sites. During protohistoric times, Period IVb, the Carrier style probably began spreading to the central islands, where it had not effected a complete replacement of Meillac techniques by the 1520's and 1530's when Spanish slave raids depopulated the islands. This spread of the Carrier style was accompanied by other traits, primarily ceremonial in nature, and perhaps by the introduction of agriculture, which we know was practiced as far north as Long Island (Las Casas 1877 Vol. 1: 227). The ceremonial traits — zemis, duhos, petroglyphs, stone effigy celts, monolithic axes — are most typical of Taino culture on mainland Haiti (Rouse 1948: 525, 535-9). The Meillac style, and the absence of an extensive ceremonial complex, are typically Sub-Taino on the mainland (Rouse 1948: 508, 516, 521). Bahamian culture was then basically Sub-Taino, with an overlay of Taino traits in the southern and central islands, introduced relatively late in pre-Columbian times.

We are left with 2 alternatives in the question of Taino penetration into the Bahamas. Such a movement might have represented either a physical migration of peoples or simply diffusion of techniques. In the case of the Turks and Caicos it seems highly probable that there was an actual migration of Indians into the region, borne out by close correspondence of Haitian and southern Bahamian traits, the use of quartz temper in pottery, and the existence of many pure Carrier sites. Although the movement continued on into the central islands, it is felt that most Taino traits there were probably the result of diffusion rather than of physical displacement.

Summary. Culturally the Bahamas were a peripheral Sub-Taino region throughout pre-Columbian times, showing close relationship to mainland Haiti. Ceramic styles were derivative from north Haitian styles and were somewhat less complex than those on the mainland. In Period IV, late prehistoric and early historic times, the people of the southern islands were joined, amalgamated with, or replaced by users of Taino traits from Haiti. This same intervention penetrated the central islands briefly, but apparently never reached the northern islands. While the northern islands remained basically Sub-Taino through Periods III and IV, the southern islands might be said to have followed about the same path as northern Haiti, and Rouse (1951: 261, Fig. 3) is fully justified in placing them in the Windward Passage area with Haiti.

Evidences of Antillean-Southeastern United States prehistoric relationships via the Bahamas are few. They have been carefully summarized by Gower (1927) and Rouse (1949). There are no cases of similarity between Bahamian and Southeastern United States culture traits which can be said to indicate a definite connection between the 2 areas. The matter is still a void, to date filled only with several questionable similarities.

There is very little data, positive or negative, concerning the presence of the Ciboney, or any pre-Arawak or preceramic culture, in the Bahamas. Periods I and II of Antillean prehistory must remain a question mark in the Bahamas for the present.

As is still unfortunately so in most peripheral regions in the Americas, the Bahamas are almost untouched and might well bear more attention, particularly for a possible solution to the question of Ciboney origin.

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University of Florida
Gainesville, Florida
July, 1955

ARCHAEOLOGICAL EXPLORATIONS IN SOUTHERN PERU, 1954-1955

PRELIMINARY REPORT OF THE FOURTH UNIVERSITY OF CALIFORNIA ARCHAEOLOGICAL EXPEDITION TO PERU

JOHN HOWLAND ROWE

FROM March, 1954, through the whole of the year 1955 the University of California at Berkeley sponsored a program of archaeological field work in southern Peru and related studies in museums of the United States. In Peru the expedition worked out of 2 bases, one at Cuzco in the highlands and the other at Ica on the south coast. It was concerned primarily with archaeological survey and exploration, although excavations were also made at 2 Inca period sites in the coastal area studied. The expedition staff consisted of John H. Rowe, Director, Dorothy Menzel (Mrs. Francis A. Riddell), Francis A. Riddell, Dwight T. Wallace, Lawrence E. Dawson, and David A. Robinson. Oscar Núñez del Prado and Manuel Chávez Ballón of the National University of Cuzco worked closely with the highland base of the expedition and took part in different phases of its exploratory work in the Cuzco area. On the coast, Alejandro Pezzia of the Regional Museum of Ica was a valuable collaborator in the expedition's researches.

The work of the expedition was supported in part by grants from the Wenner-Gren Foundation for Anthropological Research, Inc., and from the Penrose Fund of the American Philosophical Society. Part of the expense of the excavation program was borne by the Inca Highway Expedition of Victor W. Von Hagen. The Public Health Service of Ica and the Anderson-Clayton Co. generously provided laboratory and residence facilities at Ica. The expedition's field work was authorized by the Peruvian government by Resolución Suprema No. 123 of February 20, 1954, and was greatly facilitated by the interest and support of the Director of Archaeology and History, Jorge C. Muelle.

The program of the expedition was designed to provide each member of the staff with an independent research problem, the problems being framed in such a way that they could be related to one another and to previous work in the areas explored. The problems served to give purpose and organization to the work, but the members of the expedition were also expected to record any evidence not directly related to their problems which came to their attention. The following problems were formulated:

1. The development of a detailed chronology of Nazca pottery designs that would permit close relative dating of isolated museum specimens and sherds collected in the field. This problem was assigned to Lawrence E. Dawson. He began work on it at Berkeley in 1952-53, making use of existing museum collections and the grave associations recorded by earlier investigators, especially Max Uhle and A. L. Kroeber. Kroeber generously made available full information on his Nazca excavations of 1926.

2. The definition of the regional pottery styles usually grouped together as the Tiahuanaco Horizon, with special attention to the differences between the Bolivian Tiahuanaco style and the styles found at Huari in Peru. This problem, basic to any attempt to unravel the time and space relationships of the Tiahuanaco Horizon, was assigned to Dwight T. Wallace. It involved a combination of museum collection study in Peru, Bolivia, and the United States and reconnaissance in Peru.

3. The definition and chronological relationships of the post-Tiahuanaco pottery styles on the south coast. Like the first 2 projects, this one involved the analysis of museum collections, particularly Uhle's materials from the Ica valley which are in the museum at Berkeley, but it also required very extensive reconnaissance and excavation, since the post-Tiahuanaco styles of the Nazca and Acarí drainages and of the valleys further south were entirely unknown when the expedition's work started. The basic work on this problem was done by Dorothy Menzel who worked on Late Ica pottery chronology at Berkeley from 1952 to 1954 and submitted a doctoral dissertation on the subject just before leaving for the field (Menzel 1954). In Peru, Menzel undertook to define the late period style of Acarí and Chala by survey and excavation in those areas, sharing this work with Riddell whose wide ex-

perience in excavation in other areas was a great asset to the project. Meanwhile, David A. Robinson undertook the definition of the post-Tiahuanaco styles in the Nazca drainage.

4. The extension of the chronological sequence at Cuzco. This problem was assigned to Rowe who, in earlier field work in the Cuzco area, had established the outlines of a sequence of cultures there. More recent work by Chávez Ballón had filled in some of the gaps, and there was a good prospect that further joint work by the 2 men would complete the chronology, at least for the periods in which pottery was in use. It was also obviously desirable to undertake some exploration out from Cuzco in order to tie in this hitherto isolated archaeological zone with other areas where some archaeological work had been done, such as Puno, Ayacucho, and the coast.

The choice of this particular assortment of problems for study depended on a series of circumstances, including the interests and previous experience of the staff members, opportunities for fruitful collaboration with Peruvian colleagues, and the possibility of combining field studies with research on the Uhle collections at the University of California Museum of Anthropology. There is a unifying theme running through most of them, however; they contribute something to an understanding of the origins of Inca culture and the impact which the Inca conquest had on the local cultures which the Incas incorporated into their empire. The role of the Incas in Andean culture history is a key problem, because the Incas achieved a cultural unification of large sections of the Andean area which affected the whole subsequent history of the native populations of Ecuador, Peru, and

FIG. 1.

Bolivia. The California expedition's contribution to the problem of Inca origins and influence will become clearer as the results of its work are discussed below.

In an area as poorly known archaeologically as southern Peru it is obviously essential to begin by establishing a chronological frame of reference. We accepted this necessity and worked together to establish sequences of pottery styles in the regions where we operated. At the same time we were deeply concerned with the cultural interpretation of the data we were handling and interested to find how much information about cultural movements and changes we could extract even from the comparison of potsherds.

The first members of the expedition staff to start actual field work were Dorothy Menzel and Francis A. Riddell who reached Peru on March 5, 1954. Their work for the first 4 months represented a cooperative program arranged between the University of California expedition and the Inca Highway Expedition of Victor W. Von Hagen to take advantage of the overlap of research interests between the 2 projects. After some days spent visiting sites, the Riddells set up camp at Tambo Viejo, Acarí Valley, on April 1. They remained at this site until May 12, mapping the ruins and making 2 excavations in habitation refuse. They also made surface collections at a number of sites nearby and discovered one, called Hacha, which may turn out to be the earliest known site on the south coast where pottery is found.

The Acarí valley is the next one beyond Nazca, going south. It is a comparatively small valley, full of archaeological sites, many of which are visible and accessible from the main road because the valley plain is so narrow. Tambo Viejo is easily the largest site in the valley and is one of the few which are obviously stratified. It has received some attention from earlier investigators (Hrdlička 1914; Carpio 1942), but their reports hardly do more than indicate its potential interest. The earliest occupation at Tambo Viejo which we were able to identify is of the Nazca 2-3 phases (see the chronological table, Fig. 2), and is a city built of conical adobes and river cobbles, extending along the river bank for about 1½ km., with a width of about ½ km. The Nazca city is divided into 2 halves by a very large central plaza, and it is walled, as indeed are all Nazca sites we visited in the valley. The habitation areas of the Nazca site look like a maze of cobbles from the ground, but from the air they sort themselves out into the foundations of small houses. There are a number of mounds which presumably supported buildings of ceremonial or political importance.

Following Phase 3 of the Nazca style, Tambo Viejo appears to have been abandoned. There are 2 small cemeteries of Tiahuanaco horizon times at the extreme north and south ends of the site, but we could identify no habitation area of this period in the older walled town. The Incas reoccupied the site, probably toward the end of the 15th century A.D., and built their only major establishment in the valley on top of the east side of the Nazca site overlooking the river. Just north of the administrative area they built a series of storehouses, also on Nazca ruins. The Inca settlement was taken over by the Spanish, probably some time in the 1530's, and a small church was built on one side of the Inca plaza. The Spanish occupation meant no elaborate reorganization of the Inca town plan, however; for the most part, the Inca buildings continued to be used and were modified in detail as needed. Probably about 40 years after the conquest, the Spanish town was moved to a new site (modern Acarí) a short distance north of the old one, and Tambo Viejo was allowed to fall into ruins again.

The Inca Highway Expedition was interested in Tambo Viejo because the Inca center there was an important station on the main coast road, and remains of the road connecting Acarí and Nazca can be traced at several points. The Riddells therefore made a special effort to reconstruct the plan of the Inca settlement. The discovery that the Inca town had been occupied and altered by the Spanish, however, frustrated our hopes of making a detailed reconstruction without much more elaborate excavation than the rest of our program permitted. There was no marked change in adobe proportions that could serve as a clue to the identification of postconquest construction in surface remains.

From their 2 refuse cuts, the Riddells recovered an excellent sample of the type of native pottery being made at the time of the Spanish conquest. It proved to be a local polychrome style, derived from south coast Epigonal (a Tiahuanaco horizon style related to that of Huari), and having its closest affinities

with the contemporary Poroma style of the Nazca drainage. We named the local style Acarí, the original name of the Inca settlement at Tambo Viejo. The Inca occupation was represented in pottery by many Late Inca sherds which were so similar in paste to those found around Cuzco that they can probably be considered imports from the capital. There were also local imitations of Inca pieces, and an interesting fusion product, the designs of which include Inca elements, Poroma elements, and others of unknown origin. We named this style of mixed origins Sahuacarí Polychrome, after a site near the modern town of Acarí.

On May 12 the Riddells moved south to the Chala area and set up camp at the head of a small cove on the Pacific about 10 km. west of Puerto Chala. The cove is at the mouth of a dry wash called Quebrada de la Vaca (Cow Gulch), and the name is used also for the ruins which are found on the slopes on both sides of the wash just above the beach. There is no permanent flow of water in the wash at present, but traces of cultivation along its margins suggest that it may have carried water more often in the past. The rocky shores of the cove abound in shellfish, and the place is frequented at certain seasons by people from the interior who make temporary camps while they gather a supply. It was probably the shellfish which made this desert cove attractive to the ancients, as well.

Like so many of the archaeological sites on the south coast, the one at Quebrada de la Vaca was discovered by Max Uhle, who made a small collection there in September, 1905, for the Second University of California Expedition. Von Hagen rediscovered it in 1954 in the course of an aerial reconnaissance of the coastal section of the Inca highway. The ruins

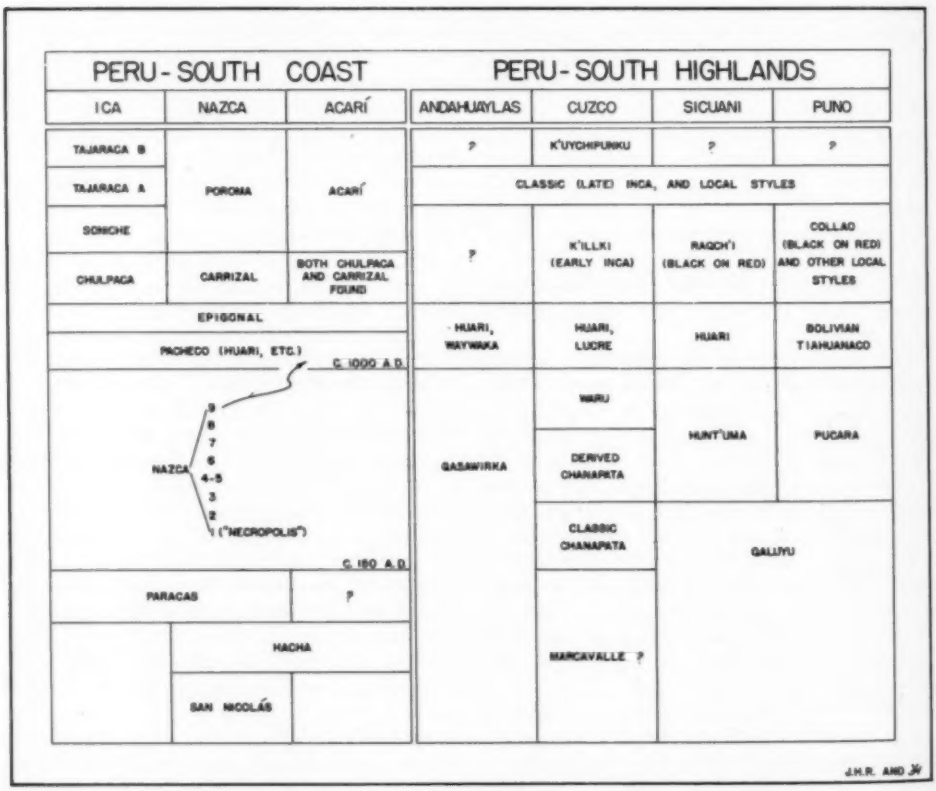

Fig. 2.

at Quebrada de la Vaca are quite spectacular on account of their unusually good preservation. They are built of field stones laid in very hard mud instead of the adobes which are the common construction material in the irrigated valleys. Most of the buildings are storage structures, including large numbers of bottle shaped silos and rectangular bins. There are also living quarters, with refuse associated, and tombs consisting of stone structures built above ground like the chullpas in the highlands. A number of specifically Inca details occur in the construction of all of these buildings, and the pottery and small finds indicate that the site was occupied from Inca times into the beginning of the Colonial period.

The Riddells worked at the Quebrada de la Vaca ruins from May 12 to July 3. They began by making an architectural study of the storage buildings on the east side of the wash and trenching a deposit of habitation refuse. Here the pottery was mainly a plain brown ware, rather poorly fired and drab in appearance, sometimes covered with a red slip. This is the common local style of the Chala area, found in surface collections at other sites visited there. Sometimes one or 2 sherds of Acarí Polychrome were found associated with it.

About the middle of their stay at Quebrada de la Vaca, the Riddells discovered that one of the ruined burial structures on the west side of the wash still contained the greater part of its original contents. They devoted about 3 weeks to excavating ⅔ of the floor area and took out 56 mummy bundles of adults and 55 of children. The tomb structure was a rectangular building with field stone walls and a flat slab roof. The entrance was by a small door in one of the long sides, facing east. The roof had fallen in or been pulled down by treasure hunters many years ago, and the mummies were found buried and protected by the ruins of the roof and walls. All the mummies had been opened by treasure hunters who slit them with a knife and reached in to remove any gold or silver ornaments. The bodies were then dumped back in the tomb without further damage. Preservation conditions were extremely good, and the Riddells were able to make extensive notes on costume and burial practices by examining the broken mummies. There were also some small objects of interest, including 4 quipus tied up in a bag and several pyroengraved gourds. There were a few Spanish glass beads in this burial house, suggesting that it continued to be used until after the Spanish conquest. The high proportion of child burials is noteworthy, and we were led to speculate that it might reflect the effect of the epidemics of European diseases which nearly depopulated much of the Peruvian coast in the first years of the conquest. The bones from this excavation are being studied by Sergio A. Quevedo of the Department of Anthropology of the University of Cuzco, and Oscar Núñez del Prado of the same department is preparing a report on the quipus. The pottery from the burial structure differs from that found in the habitation refuse on the other side of the wash. It includes Late Inca pieces probably imported from the highlands, local imitations of Inca vessels with the Chala type of brown paste, and pieces showing a certain amount of Inca influence. The differences between the 2 pottery collections seem to be ones of status rather than of time.

After closing down the excavations at Quebrada de la Vaca, the Riddells spent a few days exploring sites along the road to Ica, chiefly in the valley of Yauca and the ravines of Nazca, Ingenio, and Huayurí in the Nazca drainage. They reached Ica on July 7 and spent the next 2 weeks sorting and classifying their collections.

Rowe and the Wallaces arrived in Peru on June 29 and spent 18 days in Lima attending to expedition business and visiting sites in the Lima area with Louis M. Stumer. They also spent 2 days at the Museo Nacional de Antropología y Arqueología studying the late J. C. Tello's pottery collections from Paracas and Nazca. On July 16 they went on to Ica, where they met the Riddells and made immediate plans for a combined survey trip to fill in the outline provided by the Riddells' surveys between Acarí and Chala. Rapid transport of such a large party was made possible by the loan of a Dodge Power-Wagon and extra camping equipment by the Inca Highway Expedition.

The party drove straight through to Chala on July 19 and spent the next 8 days exploring the valleys of Chala, Yauca, and Acarí and the rocky coast between Chala and Atiquipa. We visited 31 sites, eleven of which had never previously been reported. Our survey was particularly thorough in the Acarí valley, where we were anxious to learn enough about the dis-

tribution of ancient settlements to see the Tambo Viejo site in its proper perspective. Between our work on this trip and the Riddells' earlier explorations, we cataloged 25 sites in all in the Acarí valley between the great Nazca 2-3 cemetery of Huarato at the head of the valley and the Chaviña shellmound by the river mouth.

Among the sites visited in the Chala area, two are of special interest, Chala Viejo and Ocopa. Both had been visited by the Riddells during their earlier survey, and Ocopa had also been visited by Von Hagen. Chala Viejo lies about 20 km. inland from Puerto Chala and Ocopa is on the coast just below Atiquipa.

The Chala River runs in a narrow canyon and the short stretch of it which can be irrigated does not reach to the coast. Ancient settlement was concentrated, not on the desert coast, but up the river where agriculture was possible. There is a small midden at Puerto Chala, but the settlement there became important only in the 19th century when it became an outlet for cattle driven down from the highlands. Chala proper lies inland, in the river oasis, and is a small farming village. It has lost its name to the port, in recent years, and is now usually called Chala Viejo. The village and its fields are of great archaeological interest, because modern house construction and farming methods there are virtually untouched by Spanish influence and give a remarkable impression of how the larger south coast valleys may have appeared in the days before they were replanted to grapes and cotton. The population of the oasis is not in the least Indian in physiçal type, however, and only Spanish is spoken. Here, material culture has outlasted every other aspect of ancient custom.

The present village of Chala "Viejo" is of comparatively recent origin itself, however, for across the river we found the site of an earlier settlement which is clearly "old" Chala Viejo. Most of the surface remains are Colonial, and the site of the church is easy to identify. On the slopes around the ruined town is the largest accumulation of Colonial refuse we saw at any abandoned site on the coast. There is also earlier refuse, both Inca and of the local Chala culture of Inca times, and it appears that here, as at Tambo Viejo, the Spanish began by taking over an Inca settlement. On a ridge beside the site are a number of looted tombs consisting of rectangular chambers dug into the ground and roofed with stone slabs. We found broken Inca pottery in one of them. "Old" Chala Viejo is now used as a cemetery by the inhabitants of the new town, and the graves, marked by tall wooden crosses, cluster thickly in and around the ruins of the church. The archaeologist is reminded forcibly of the intrusion of Tiahuanaco horizon burials in the terraces of the Huaca del Sol at Moche and other uses of earlier ceremonial structures as burial grounds both in and out of Peru.

Ocopa is the site of a large town, built of field stones, on a windswept headland strewn with large granite boulders. The broken walls merge into the stony landscape so that the ruins are not recognizable from a few hundred feet away. They are, however, visible from the Panamerican Highway if one knows where to look. The slopes around the ruins are covered with linchets (rudimentary terraces without facing), indicating that the area was at one time under cultivation. There is now not enough water to irrigate this area, the available supply being used further inland at Atiquipa. At least the distribution of water, if not the quantity, must have been different in ancient times, here as at Quebrada de la Vaca.

The surface sherds at Ocopa are mainly of the plain brown ware characteristic of the Chala area. A few sherds of Acarí Polychrome occur also, suggesting an Inca period date for the site. Partly, perhaps, because of the poor preservation of the walls, fewer Inca features can be distinguished in the stone construction than at Quebrada de la Vaca.

On the second visit to Ocopa we were able to identify the major shrine of the ancient town, with its cult image still standing. The "image" is a large monolith of granite standing about 5.5 m. high, with natural cavities in the surface near the top which suggest a human face. The resemblance to a face may have been accentuated by ancient reworking; the surface is so weathered, however, that hammer markings can no longer be distinguished. The cult stone faces a small rectangular plaza and has a low field stone wall about the base. The only entrance to the enclosure around the stone is by a curved ramp which comes up at the back of the stone and gives access to a small paved doorway on one side of it. Although it can hardly be said to have any great artistic value, this stone at Ocopa is the only ancient

cult object identified on the Peruvian coast which is still standing in its original shrine, and hence it has some archaeological interest.

After our return to Ica, we devoted 2 weeks to investigations of the archaeology of the Ica valley. We first interviewed Pablo Soldi, a well known collector who has a special interest in Paracas and Nazca cemeteries. He showed us his collection from a Paracas site in the upper end of the valley and permitted us to take notes on some of the specimens. The Paracas ware from Soldi's site is quite different from that which Tello found at the Cavernas site on the Paracas Peninsula near Pisco and from the Ocucaje material which Kroeber published (Kroeber 1944, Pls. 13-16). The specimens from Soldi's site are crusted (painted after firing) like those from the other 2 Paracas centers, but the pigments used are different. They are more powdery and fugitive, suggesting the use of a less durable binder material, and they include a cloudy blue color instead of the green hues found on vessels from the Pisco and Ocucaje sites. A number of specimens from Soldi's collection also have negative painted designs on one side and crusted ones on the other. At the other Paracas sites, negative painting and crusting both occur, but never on the same vessel. Since the new style we studied in Soldi's collection has so far been found only in the upper Ica valley, we are calling it Hanan-Ica from the Inca term for this part of the valley. Strong, who excavated a grave lot of the new style at Soldi's site in 1952, regards it as probably earlier than the Pisco and Ocucaje styles (Strong 1954), but the possibility that it is a contemporary local variant cannot be ruled out on present evidence.

Our next project in the Ica valley was to make a detailed survey of the ruins of Tajaraca, the largest site in the whole valley, which lies about 10 km. south of the modern city of Ica. This site was the original "Ica" of Inca times and was the place where the Spanish town of Ica (Villa de Valverde) was first established after the conquest. The name Tajaraca was bestowed on it by Uhle and is very possibly a mistaken form derived from the name of the Hacienda Tacaraca which occupies the northwest corner of the site. Uhle's variant of the name provides a convenient means of disguishing the site from the hacienda, however, and we have continued to use it. Tajaraca consists of a complex of adobe ceremonial mounds scattered among the modern cotton fields, with patches of habitation refuse and extensive cemeteries on the low sand hills which interrupt cultivation here as in many other parts of the valley. It is thus more comparable in general layout to Maranga in the Lima valley than to more concentrated urban type settlements like Cajamarquilla or Tambo Viejo. The surface sherds around the mounds and in the looted cemeteries indicate a wholly post-Tiahuanaco horizon occupation, belonging mainly to the Chulpaca, Soniche, and Tajaraca phases of the Ica style (Middle and Late Ica of Kroeber and Strong 1924). Inca sherds are restricted to the northwest corner of Tajaraca, occurring in and near the same areas where remains of Spanish buildings and Colonial wheel-made pottery are found. We mapped the site at a scale of 1:10,000 on the basis of an aerial mosaic made by the Peruvian Air Photography Service and then visited every sector on the ground to make survey notes and surface collections.

Uhle's field work in the Ica valley in 1901 included excavations at several places in the area of Tajaraca, and his collections from there were designated by Kroeber and Strong with the letters M, T, X, Y, and Z. We were very anxious to locate and revisit as many of Uhle's sites as possible so as to collect additional information that would be valuable in interpreting the collections in Berkeley. The identification of Uhle's sites is not always a simple matter, for his notes on site location are sometimes tantalizingly vague. We found the area where Uhle dug the M and Y collections at Chulpaca (our Sector F) and identified by elimination the place on the Hacienda Galagarza where he made the X and Z collections (our Sector G). The T collection came, according to Uhle's notes, from a patch of sand hills "on the road between Chulpaca and Tate." A sketch map in Uhle's catalog made a positive identification of this place possible, and it turned out to have a native name, Soniche, which Uhle had failed to discover. The identification of the Soniche site (our Sector J) is especially important because it was there that Uhle found the superposition of tombs which enabled Dorothy Menzel to distinguish the local style of early Colonial times from that of the Inca period in her reclassification of Uhle's Late Ica collection (Menzel 1954).

When we attempted to locate sites in other parts of the valley, we quickly found that the best available maps (the Peruvian topographic sheets at 1:200,000) were too large scale and too inaccurate for any sort of detailed work. We therefore devoted some time to constructing a new map at a scale of 1:50,000 on the basis of the Air Photography Service mosaic that we could use in later explorations.

Since the highland dry season ends in November and travel there is difficult after the rains start, we decided to interrupt our work on the coast in the middle of August and move to Cuzco, which we used as a base for explorations between August 18 and December 9. Rowe and Wallace were the expedition members especially concerned with the highland survey operations, but Menzel assisted them for 2 weeks at the beginning of the period and another 2 weeks at its close. She spent the rest of the time at Ica, working up the results of the expedition's work on the coast. Riddell returned to the United States in August, and Mrs. Wallace left in September.

Our work in the highlands included 4 long trips, to Andahuaylas, Sicuani, La Paz, and Paucartambo, with shorter excursions to sites in the immediate neighborhood of Cuzco in between as time permitted. We made extensive notes on surface remains at the sites visited but undertook no excavations.

In our work near Cuzco we were following up earlier research done by Rowe in 1941-43 (published in 1944) and in 1946, and by Manuel Chávez Ballón, Professor of Peruvian Archaeology at the University of Cuzco, between 1951 and 1954. Rowe's 1944 report describes a sequence of 3 pottery styles in the Cuzco area: Chanapata (an early style with some Chavín horizon affiliations), K'illki (Early Inca), and Cuzco (Late Inca). In 1946 he identified the Inca style of the early Colonial period and named it K'uychipunku. There remained a gap between Chanapata and the Early Inca style, and this gap was filled by Chávez Ballón by his excavations at the stratified site of Batan 'Urqo near Huaro, about 40 km. southeast of Cuzco, in 1952. The accidental discovery of 2 deep offering pits on top of Batan 'Urqo (Mill Hill) had given rise to the most sensational rumors of buried treasure there, and the authorities commissioned Chávez Ballón to excavate around the offering pits and establish the facts of the matter. The buried treasure rumors proved, as usual, to be false, but Chávez found some looted tombs of cut-stone slab construction like those at the Tiahuanaco horizon site of Huari, and there were Huari sherds associated with them. This find established the fact of a Tiahuanaco horizon occupation in the Cuzco area. A deep refuse deposit adjacent to the tombs yielded a stratigraphic sequence with the Chanapata style on the bottom, next a style which Chávez is calling Waru (the Carmenca style of Rowe 1944: 19-20), next, a new style called Lucre, associated with Huari types, and finally Early and Late Inca at the surface (compare Reichlen 1954). Following the discoveries at Batan 'Urqo, Chávez found traces of Tiahuanaco horizon occupation at a number of other sites in the Cuzco area, including one within 5 km. of the city itself.

The California expedition was much interested in Chávez' Tiahuanaco horizon finds and revisited all the sites where he had found material of this type. Wallace, who had familiarized himself thoroughly with the pottery designs of the Bolivian Tiahuanaco style before leaving for the field, was able to determine that none of the sherds found belonged to the Bolivian Tiahuanaco type, while most of them corresponded exactly to the Tiahuanaco horizon style of Huari. It is especially significant that we found no sherds in the Cuzco area belonging to the so-called "Ayacucho" (Nazcoid) style which Bennett found mixed with the Huari style at the site of Huari itself (Bennett 1953).

Chávez' discovery of Tiahuanaco horizon refuse in the Cuzco valley led us to a partial solution of one of the major archaeological puzzles of the area, the cultural affiliation and date of the huge field stone ruin of Pikillaqta in the Lucre basin. The architecture of the Pikillaqta site is wholly unlike Inca building practice and its closest similarity is to certain constructions at Huari. The great halls and courts of Pikillaqta contain no habitation refuse and no pottery of any kind, however, and we were reluctant to postulate a Huari occupation of the Cuzco area on the basis of architectural similarity alone. With Huari habitation sites known in the vicinity, an attribution of the site to the Tiahuanaco horizon seemed much more plausible.

There is in addition some supplementary evidence which makes an attribution of Pikillaqta to the Huari culture more convincing. The only small objects that have been found at Pikillaqta are tiny turquoise statuettes, 2 caches of which were discovered in 1927. We were told by Rafael Larco Hoyle that similar statuettes had been found at Huari, and Chávez confirmed the statement. Subsequently, Wallace examined the Pikillaqta statuettes and identified a number of Tiahuanaco horizon features. It should be noted that we are no nearer than before to an explanation of why this immense site contains no habitation refuse.

The expedition found a number of new Chanapata sites in the Cuzco area and noticed that they lacked the polished black ware which was such a prominent feature of the collection from the site of Chanapata itself. The pottery of the new sites is predominantly red fired and has a reddish or brownish surface. Having observed this difference, we reviewed the sherd counts from the Chanapata site and found that there was a decrease in the frequency of polished black ware from bottom to top of the Chanapata midden. This situation suggests that the sites with red fired ware only are later than the main occupation at Chanapata. We gave the name "Derived Chanapata" to the newly identified red phase; the type site for it is Wimpilla (Rowe 1944: 22-3).

We identified another new variety of Chanapata ware at Marcavalle, a site near the Cuzco airport discovered by Chávez. Very few decorated sherds turned up at this site, but those that did occur are different enough from the classic Chanapata types to suggest the possibility of a time difference. Since we have already identified the style which follows and grows directly out of classic Chanapata, the Marcavalle style should be earlier.

Our trip to Andahuaylas (September 20 to October 2) was organized in collaboration with Oscar Núñez del Prado of the University of Cuzco, and we called it, not wholly in jest, "The International Archaeological Expedition to Apurimac." On this trip we carried out a systematic survey of the valleys of Curahuasi, Abancay, and Andahuaylas, the first such survey ever undertaken in the Department of Apurimac.

The valley of Curahuasi reminded us archaeologically of the Chala area on the coast, as it also seems to have been the home of a tradition of drab, unpainted pottery. We identified the site of the Inca town of Curahuasi at a place called Mallawpampa, across the road from the present town, and found virtually no painted pottery there except imported Inca pieces. We were shown some handsome Huari style cups which had been found in graves on the Hacienda Molle-molle Alto but were not able to locate any occupation refuse containing Huari sherds in the time available to us.

The Abancay valley is an archaeological puzzle because it contains virtually no habitation sites in spite of its obvious attractions for Andean farmers. We found only one site of importance, a place called Qorwani where there were ruins of early Colonial buildings, and we found sherds of a local imitation of Inca pottery on the surface. It is always dangerous to argue that sites are absent because one has not found them, so I will merely say that the same amount of searching in any of the other Peruvian valleys where we worked would have turned up at least a dozen sites the size of Qorwani.

The valley of Andahuaylas, in contrast, is thickly springled with sites, and we visited several as large and as rich in decorated pottery as any we saw in the Peruvian highlands. We explored the south side of the valley rather thoroughly and made side trips to Huancabamba and Lake Pakucha. We were able to identify 2 different pottery styles at the sites visited, and we named these styles Qasawirka and Waywaka after 2 large sites in the vicinity of the town of Andahuaylas. The Qasawirka style is related somewhat distantly to Derived Chanapata in paste characteristics and surface finish. The most elaborately decorated pieces are painted in back and white on a rich dark red background in simple geometric designs. The Waywaka style has an orange wash background and sloppily painted designs in black and red. Some of the designs show definite Huari influence, and the Waywaka style is probably to be interpreted as a local product contemporary with the Huari occupation. Qasawirka, Waywaka, and Huari sherds all occur on the surface at the site of Waywaka, a habitation site on a prominent hill across the river from the town of Andahuaylas, and it is quite possible that the site is stratified. We were shown some pottery from an Inca cemetery on the north side of the valley but did not visit the place. We were especially anxious to

identify the local post-Tiahuanaco style but failed to find it at the sites we visited. Very likely the occupation of this period was concentrated on the north side of the valley, where the Colonial and modern towns are, and we did not have time to cover this area also. We cataloged a total of 15 sites near Andahuaylas.

On our trip to the Sicuani area (October 23 to October 31) we were accompanied by Manuel Chávez Ballón. We stayed at San Pedro de Cacha, where the famous Inca ruins of the Temple of Wiraqocha are located, and the town proved to be a convenient base for explorations in several directions. We spent 2 days measuring the Inca temple and making notes on its construction. Nearby, at Yanamancha, we made extensive sherd collections representing virtually the whole history of the Cacha area. The site of Yanamancha consists of refuse deposits in small cultivated fields cleared in the jumbled volcanic stone of an old lava flow. The modern highway cuts through one end of the site, exposing a stratification of refuse and fill in the road cut. The pottery below the fill is of the Qaluyu style, previously reported only from the Department of Puno. It was discovered first by Rowe at the site of Qaqachupa, near Ayaviri, in 1942, and later independantly by Chávez at Caluyo (Qaluyu) near Pucara. In the road cut at Caluyo there is a clear physical stratification, with the Qaluyu style under Classic Pucara. There are 2 types of decorated vessels in the Qaluyu style, one with broad incision and no paint and the other with simple geometric designs painted in red on cream or chocolate on cream and no incision at all. Above the fill in the Yanamancha road cut is another incised style, identified for the first time by the expedition. It is a red fired ware with comparatively narrow incised lines outlining areas painted in black, red, and sometimes white. In rim forms and designs it resembles most closely the Derived Chanapata style of the Cuzco area. We named this new style Hunt'uma because we found 2 virtually pure sites of it at a place of that name near Tinta. On the surface at Yanamancha, overlying Hunt'uma refuse, were Tiahuanaco horizon sherds of the Huari type with no admixture of Bolivian Tiahuanaco. The observation that the Tiahuanaco horizon occupation of the Sicuani area is of Huari rather than Bolivian type is especially important since it indicates an extension of the Huari style much further to the southeast than anyone had expected. The characteristic post-Tiahuanaco style of the area around Sicuani is a carelessly painted black on red (Raqch'i style), related to the Collao Black on Red of the northern Titicaca basin. It is not common at Yanamancha but occurs at hilltop sites in the same general area. The Inca occupation is represented in ceramics by Late Inca sherds of Cuzco type and local imitations of Inca vessels found in some abundance around the complex of buildings associated with the Temple of Wiraqocha. Our survey thus yielded a tentative and almost certainly incomplete sequence of 5 pottery styles for the area around Sicuani. Their probable chronological relationships are summarized in Figure 2.

We made side trips to Suyu, just south of Sicuani, to Tungasuca, and to Sangarará, visiting a number of sites on each trip. At Suyu we photographed a standing stone with fishes carved on it in relief in what looks like a simplified Pucara style. The site where it was found, in the village cemetery, had mainly Hunt'uma style pottery on the surface but there were a few Huari type sherds also. On the trip to Sangarará we stopped at Pomacanchi and recorded a large habitation site with over a meter of Hunt'uma style refuse at a place called Llawllipata; the refuse at this site is unusually rich and it would well repay excavation. We also identified the post-Tiahuanaco style of the Pomacanchi area; it is a provincial variety of K'illki rather than the black on red characteristic of the areas further south.

The trip to La Paz was made by Wallace alone (November 8 to 27). His program included making notes on over 300 whole vessels of the Bolivian Tiahuanaco style in collections at La Paz and visiting a number of sites in the Department of Puno to look for Tiahuanaco horizon sherds. Among the sites visited was an important one in the city of Puno itself, which Chávez had told us about. It yielded Bolivian Tiahuanaco, not Huari, materials, as did a habitation site somewhat further north at Juliaca. The zone of contact between Bolivian Tiahuanaco and Huari, if any, must therefore be sought between Juliaca and Sicuani.

The trip to Paucartambo was made by Rowe and Menzel (December 1 to 5). They found that modern Paucartambo occupies the exact site of the Inca town, a situation explainable by

the fact that Paucartambo is the best bridge site in its valley for miles in either direction. A number of Inca ruins are still standing, both near the bridge and on a hill west of the river. There is also an 18th century ruin at Paucartambo, the remains of a fort built by the Spanish garrison in 1781 to defend the bridge against Thupa Amaru's Inca rebels. From Paucartambo the expedition party crossed the last range of the Andes and drove down the Cosñipata valley into the montaña as far as the highway penetrates, below Asunción. The modern road follows a different route from the Inca one, however, and no sites were observed on this brief reconnaissance.

Rowe and Menzel left Cuzco on December 9 and returned to Ica via Arequipa. At Ica they spent 2 weeks extending the site survey of the Ica valley begun in August and working on coastal pottery classification. The first objective of the survey work in Ica was to identify and revisit the sites near Santiago and at Ocucaje which Uhle had explored in 1901, thus completing our follow-up on the work of the First University of California Expedition. Most of Uhle's sites, including all the ones of key chronological importance, could be identified without much difficulty on the ground, but there were a few cases in which Uhle's description was so vague that no choice between several possible alternatives was possible. In the Ocucaje area we were particularly interested in a patch of dry hills surrounded by cotton fields where Uhle dug his first Nazca grave (Site A of Kroeber and Strong 1924) and where he found 3 Paracas burials without fully recognizing their significance (Site H). The present inhabitants of the area were unable to give us a local name for the hilly mass where these sites are located, so we decided that it would be appropriate to name the place "Cerro Max Uhle" after the pioneer of south coast archaeology whose footsteps we were following. There are a number of rich Paracas cemeteries on the north end of Cerro Max Uhle which were stripped in the 40's by the pot hunters who formed the famous Truel Collection. At the south end is a ruined town of the same age as Tajaraca but smaller.

Another part of the expedition's survey program was carried out by David A. Robinson who joined the expedition in July and spent the next 6 months cataloging sites in the Nazca drainage, chiefly in the ravines of Poroma, Taruga, and Nazca. Most of the sites studied by Robinson are cemeteries of post-Tiahuanaco times, a period which attracted our attention because it represents the least known part of the cultural sequence in the Nazca area. The large surface collection resulting from this work was studied by Robinson and Menzel and sorted into 3 major types, largely by analogy with the better known Ica sequence and by comparison with the Riddells' Inca period materials from Acarí. The earliest of the new types is Epigonal of Nazca, very similar but not identical to the Epigonal of Ica represented by the collection from Uhle's Site E at Ocucaje. Next is the Carrizal style, related to the roughly contemporary with Chulpaca (Middle Ica). The latest style in Nazca is Poroma, equivalent in time to Soniche and Tajaraca (Late Ica) in the Ica valley. This is as refined a classification as can be made on the basis of surface collections alone, but the Poroma style can almost certainly be subdivided when archaeological associations become available.

The last few weeks of the season were devoted to studying the collections made and closing up the field offices. Rowe and Wallace returned to the United States in January, 1955, and Menzel a month later. The collections resulting from the expedition's work were placed in their entirety at the disposition of the Dirección Nacional de Arqueología e Historia, with the suggestion that the coastal collections be deposited in the Museo Regional de Ica and the highland materials in the Laboratory of Archaeology at the University of Cuzco. Notes and drawings were made before leaving Peru so that reports could be written if necessary without further access to the collections. We hoped in this way to speed up work on the reports and at the same time to provide an objective demonstration to the Peruvian public that we were interested in collecting scientific data, not specimens. Our procedure has the further advantage that it places our collections where they can conveniently be consulted by future workers in the same area who may wish to use them for comparison. In Cuzco particularly, where there is an active program of archaeological research going on at the University, it is highly desirable that the type collections for the area be available to local research workers.

The expedition began a second season of work in June of 1955 when Rowe, Dawson, and Wallace met in the New York area to devote several weeks to the study of earlier archaeological collections from the regions in which the expedition had been doing field work, especially those in the museums of New York, Philadelphia, and New Haven. Rowe also looked over the Peabody Museum collections in Cambridge, and Wallace visited the Chicago Natural History Museum. Wallace concentrated on the Bandelier and Bennett collections from the Tiahuanaco area of Bolivia which are at the American Museum of Natural History and on Bennett's collections from Huari and vicinity at Yale. Dawson worked on Nazca pottery collections, noting especially associations of design elements not apparent in the materials available to him in Berkeley. We were fortunate enough to be able to reconstitute 20 useful Nazca grave lots in the Farabee Collection at the University Museum in Philadelphia, and these lots provided a valuable check on a number of points in the Nazca series. Our stay in the New York area also gave us an opportunity to acquaint ourselves with the work done in Nazca and Ica in 1952-53 by the Columbia University Expedition. W. D. Strong and his associates at Columbia generously put every facility at our disposal, and we exchanged much useful information. Our principal concern was to learn enough about the results of the Columbia University work so that we would not make interpretations of our own data which conflicted with data gathered by the Columbia group.

In August, Dawson left for Peru to continue the expedition's program of archaeological survey work in the Ica area and to study existing Peruvian collections of Nazca and related specimens. This work is still in progress at the time of writing and the results will be described in a later report.

In the foregoing narrative, some highlights of the conclusions drawn from the expedition's work thus far have been presented in local context. We can now turn to a discussion of the more general implications of the expedition's findings and suggest how they can contribute to the over-all picture of Peruvian archaeology. Since, especially for the earlier periods, we do not yet know how to match the Cuzco sequence in any detail to that of the south coast, it is more prudent to treat the 2 areas separately.

On the south coast the California expedition found no new evidence of a preceramic occupation, but it did find indications of a new cultural horizon which is probably the oldest yet discovered in the area. The discovery was made by the Riddells at the Hacha site in Acarí, where they found pottery decorated with incised fillets and an extensive stone industry including large flake hoes or adzes. We inferred an early date for the Hacha assemblage in Acarí on the grounds that the whole known south coast sequence, from Nazca 2 on, seemed to be present at other sites in the valley, leaving no room for such a style at a later date. Subsequently, in looking over the collection from Strong's test cut at Cahuachi, we identified a few sherds of the Hacha type in the lowest level of the cut. Since these sherds were found in a level which also yields Paracas and Nazca 1 materials, it would be difficult to justify separating them for listing as an independent type on the basis of their Cahuachi occurrence alone. The existence of a separate site yielding this type is the decisive factor. The Hacha site is a small one and not very informative, so it is to be hoped that a better type site can be found in the near future.

Our work on the Paracas culture consisted mainly of making notes on whole vessels in existing collections and cataloging a number of Paracas sites in the Ica valley. One of the new sites, Huaca Pantaleón, is of interest because it is the first site reported in the Ica valley which has Paracas habitation refuse. Dawson has included much Paracas data in his Nazca style sequence because of the obvious continuity between Paracas and Nazca.

Dawson's Nazca studies, done as part of the expedition program, have far-reaching significance for the chronology of the south coast. He worked out a sequence of 9 style phases in Nazca pottery by seriating the available specimens between the known extremes of Paracas on the one end and a group of pieces showing definite Huari influence on the other. The seriation was done by noting the occurrence of over 200 style features (details of design or shape) and arranging the specimens in such an order that all or nearly all of the features studied showed a continuous distribution in time from their first introduction to their dis-

appearance. Dawson tabulated the associations of style features on about 3000 vessels in the course of this project. The division points between the 9 phases are arbitrary and are marked by changes in some of the commonest features. Since it is theoretically possible for stylistically progressive pieces to be made and used at the same time as stylistically conservative ones, the phases of a seriation like Dawson's do not necessarily represent separate chronological units. Whether they do or not can be determined from archaeological associations such as grave lots. If vessels assignable to 2 adjacent style phases consistently occur together in grave lots, the phases in question are probably contemporary. If, in some grave lots, only pots of a single phase are found, the phase is probably a separate chronological unit. Dawson checked his phase sequence against the grave lots recorded by Uhle, Farabee, Kroeber, Strong, and Lothrop — all the known Nazca grave lots in American collections — and concluded that each of his phases was a separate chronological unit except for 4 and 5 which turned out to be contemporary.

Dawson's Nazca phases were established independently of all previous classification schemes for Nazca, and they do not correspond to the units of any such scheme in any simple fashion. It was, indeed, the inconsistency noted in earlier schemes and their failure to match the evidence of grave associations that led us to formulate the Nazca project in the first place. Roughly speaking, however, Nazca 1 is Tello's Paracas Necropolis plus Strong's Proto-Nazca; Nazca 2 and 3 correspond to Gayton and Kroeber's Nazca A, plus some materials which they included in X, B, and Y; Nazca 4-5 is a transitional style, as suggested by the divergence of style found in it; Nazca 6 and 7 correspond to part of Gayton and Kroeber's Nazca B and part of Tello's Chanka; and finally Nazca 8 and 9 include many of the pieces which Gayton and Kroeber classed as Nazca Y. Dawson's scheme provides a sensitive chronology for a long and important period of south coast history and permits the dating, and hence the profitable study, of the numerous Nazca pieces without provenience in museums and private collections throughout the world.

Dawson's Nazca sequence is based mainly on the study of whole specimens in collections. The expedition also made some observations bearing on Nazca problems in the course of its field reconnaissance work. Our survey contributes to the determination of the southern frontier of the Nazca culture, for one thing. Nazca remains are abundant in Acarí but we found none in Yauca. They may, of course, exist in the latter valley, but if so they are less abundant and probably of a different character from the ones in Acarí. Another interesting point is that all the large Nazca habitation sites found in Acarí belong to Phases 2 and 3 and appear to have been abandoned following Phase 3. Both in Acarí and Ica we were on the lookout for regional differences in the Nazca style. It turned out, however, that the style was very homogeneous in any given phase except for one slightly aberrant site near Santiago in the Ica valley, where Uhle had made a surface collection before we visited it.

The Tiahuanaco horizon poses many serious problems of interpretation, on the south coast as elsewhere, and more field work will be needed before these problems can be solved. The California expedition can contribute some clarification of the pottery style units involved, however, chiefly as a result of its work with older collections. One important unit is represented by the site of Pacheco in the Nazca valley where Ronald L. Olson dug in 1930 for the American Museum of Natural History. Olson's sherd collection appears to contain a mixture of Tiahuanacoid ("Wari") and Nazcoid ("Ayacucho") specimens of the sort that Bennett found later at the site of Huari (Bennett 1953), although not necessarily in the same proportions. Another unit is represented by the Epigonal cemetery at Ocucaje (Site E of Kroeber and Strong 1924) where Uhle dug 15 graves yielding a homogeneous style of pottery. The Pacheco unit is more closely related to Nazca in style and hence is probably the earlier; the Epigonal unit appears to be directly ancestral to the later Ica styles. Robinson's sherd collections from the southern ravines of the Nazca drainage indicate the presence there of Epigonal pottery only slightly different from that of the Ica valley. A third style unit of the Tiahuanaco horizon is Dawson's Nazca 9, a phase representing the last gasp of the Nazca tradition and under heavy influence from something like the Pacheco unit. Nazca 9 may be contemporary with Pacheco; alternatively, it may be even later, for there are indications of Tiahuanaco horizon influence also in Nazca 8. It is very possible that some of the materials

which Tello called "Rukana" (compare Gayton and Kroeber 1927, Pls. 14 *A, B,* 16 *E*) should be set up as a fourth unit, but no site of this style has been reported yet.

Both the Pacheco and Epigonal styles appear to be intrusive on the south coast, coming into the area from centers in the sierra. It is possible that Epigonal developed out of Pacheco on the south coast itself, but the differences between the 2 styles are such as to make it more likely, on the evidence now available, that the Epigonal style was developed elsewhere and represents a second intrusion.

The relationships of the Pacheco and Epigonal style units to the local south coast pottery tradition are quite different. The Pacheco style contains a strong element of Nazca influence, and the latest phases of the Nazca style similarly show Tiahuanaco horizon influence. It is even possible that there was no distinct period when the Pacheco style dominated the area alone, following the end of the Nazca tradition; Pacheco may have been wholly contemporary with the latest Nazca phases. The Epigonal unit, on the other hand, marks a sharp break. The Epigonal style contains little or no Nazca influence, and the local styles which followed it trace their tradition to Epigonal and not to Nazca. Paralleling the changes in pottery style, there are drastic changes in other aspects of culture as well. Uhle was much impressed by the contrast in burial methods and head deformation between Epigonal and Nazca, for example. The Epigonal unit apparently marks the virtual replacement of one culture by a radically different one on the south coast, a situation which contrasts strikingly with that in the Chimu area where the native tradition survived the Tiahuanaco horizon intrusion and reasserted itself strongly in subsequent periods.

In the post-Tiahuanaco period, the Ica valley took a clear artistic lead in pottery making. The Inca potters developed a sequence of complex and sophisticated pottery styles classified by Menzel (1954) as Chulpaca, Soniche, and Tajaraca, the Middle and Late Ica of Kroeber and Strong. The prestige of these Ica wares was such that they were traded at least as far south as Acarí. while the local wares of the Nazca drainage and Acarí are rarely found at Ica, where they apparently had little or no market. The prestige of Ica pottery did not keep the south coast stylistically unified, however. The pottery traditions of the area diverged regionally, so that the Carrizal style in the Nazca drainage is more different from its Ica contemporary, Chulpaca, than Nazca Epigonal is from Ica Epigonal, and the Inca period styles of Tajaraca (Ica), Poroma (Nazca), and Acarí (Acarí) are still more different from one another. All in turn are markedly different from Chincha, Uhle's identification of the Late Ica style with Late Chincha being one of his most spectacular stylistic blunders.

The Inca conquest in the late 15th century did not seriously disrupt local cultural traditions on the south coast. The Incas built a series of administrative centers along their main coast highway, at Tajaraca, Ingenio, Paredones (Nazca), Tambo Viejo (Acarí), and probably Chala Viejo. Of these, the one at Tajaraca was added to an already existing native town, and the same may be true at Chala Viejo. The others were built on abandoned Nazca sites. In these centers, Inca pottery and local imitations of it are fairly common; elsewhere they are rare, and the native culture seems not to have been seriously affected by the Inca domination except among the higher nobility. By and large, the amount of Inca influence in the contents of a tomb of the Inca period is proportional to its wealth.

The Spanish conquest meant at first that Spanish officials took over the Inca administrative machinery, beginning in the south coast area about 1534. The first Spanish towns were organized at the Inca administrative centers, and glazed and wheel-made pottery can be found mixed with Inca and local refuse at such sites. Elsewhere, evidence for Spanish influence is confined to glass trade beads in the early years of the Colonial period. Spanish rule made itself seriously felt only about 1570 when the government forced the native population to abandon its traditional settlements and move to new towns where recalcitrant conservatives would find it more difficult to maintain the native religion under the watchful eye of resident Spanish priests. The ancient burial practices were forbidden and the abandoned habitations and cemeteries became archaeological sites.

The archaeological record thus confirms the evidence of historical documents and ethnological observations that the south coast was not one of the areas where the local cultures were successfully assimilated to a common Inca

pattern following the Inca conquest. The coastal record will provide a valuable basis for comparison when some of the highland areas which were assimilated can be studied from this point of view.

Archaeological work is infinitely more difficult in the highlands than on the coast. Sites are harder to find, more subject to later disturbance, and poorer in contents because preservation conditions are generally poorer. It is thus not surprising that we cannot offer as detailed a reconstruction of stylistic sequences for the highland areas studied as we can for the south coast, and that fewer inferences to cultural events are yet possible. The general outlines of the archaeological story are beginning to appear, however, particularly in the Cuzco area.

No early man finds or refuse suggesting a preceramic occupation have yet turned up in the area around Cuzco. The possibilities of finding late glacial remains there are relatively promising, however, since several finds of Pleistocene animal bones have been made near Cuzco recently. The expedition made one such find in the course of its work, a locality on the edge of the Plain of Anta which yielded a glyptodont bone and fossil horse teeth. Carlos Kalafatovich, Professor of Geology at the University of Cuzco, is well aware of the possibilities and is keeping careful watch for remains of human industry in Pleistocene localities.

The known occupation of the Cuzco area begins with the Chanapata culture, of which at least 2 and possibly 3 phases can be distinguished at present. Chanapata pottery resembles the Chavín horizon pottery of northern Peru in technical features and methods of decoration, but lacks the distinctive Chavín art style most elaborately developed in Cupisnique pottery. The California expedition studied one related style in the Andahuaylas area (Qasawirka) and discovered another (Hunt'uma) near Sicuani. It appears likely, therefore, that the southern Peruvian highlands supported a series of regional styles at the time level represented by Chanapata, all sharing such technical features as low-temperature firing, incised decoration, and smoothing with prominent polishing marks. The discovery that the very early Qaluyu style occurs near Sicuani as well as in the Departmeent of Puno provides a valuable cross check between the 2 areas.

There was at least one style in the Cuzco area intermediate between Chanapata and the Tiahuanaco horizon, the one which, following Chávez, we are calling Waru. The expedition found no new evidence on the Waru style, however, and its definition awaits the publication of Chávez' report on his excavations at Batan 'Urqo. Parallel styles have not yet been identified in the Andahuaylas and Sicuani areas.

In the highlands of Cuzco, as on the south coast, the Tiahuanaco horizon is intrusive and marks a sharp break in the local ceramic tradition. It is represented most commonly by small numbers of sherds of a very pure Huari style, probably representing physical imports. Two important features of this intrusive style have been mentioned earlier but deserve to be listed again for emphasis: (1) Only the style of Huari is found as far south as the Sicuani area; Bolivian Tiahuanaco sherds have not been found north of the Department of Puno. (2) The sherds found are all of the Tiahuanacoid strain ("Wari" in Bennett's terminology); no sherds of the Nazcoid strain (Bennett's "Ayacucho") which occurs mixed with the Tiahuanacoid strain at Huari and Pacheco have been found in the Tiahuanaco horizon sites of Apurimac and Cuzco. This distribution pattern suggests a sharper chronological distinction between the 2 strains than can be drawn in the collection from Bennett's test cuts at Huari. Was the refuse at Huari more disturbed than Bennett thought?

The Tiahuanaco horizon occupation in the Cuzco area is heavily concentrated in the lower end of the Cuzco valley, in the Lucre basin and neighboring areas, and we can probably attribute to it the great ruin complex of Pikillaqta which overlooks the Lucre basin from the north. No habitation refuse has been found at Pikillaqta itself, but there appears to be fairly abundant Tiahuanaco horizon refuse at Raqch'i (not to be confused with the Raqch'i at Cacha), a place not far away on the east side of the same valley. The Lucre area may well have been a major center for the dispersion of Huari culture in this part of the Andes.

Both at Andahuaylas and in the Cuzco area there appear to have been local pottery styles, under more or less intensive Huari influence, flourishing during and probably just after the Huari intrusion. The local style in the Cuzco area (Lucre) is the immediate ancestor of the K'illki or Early Inca style, and Classic Inca pottery is a development from the Early Inca

tradition. It is thus becoming clear that a remote continuity of pottery tradition links Inca ware to that of the Huari expansion, and it becomes easier to understand the persistence in Inca usage of 2 shapes, the food plate and the tumbler-shaped drinking cup ("kero"), which have characteristic Tiahuanaco horizon beginnings on the coast. The expedition's researches into the pottery sequence at Cuzco thus made a direct contribution to the problem of Inca origins.

In the Cuzco region as on the south coast the Tiahuanaco horizon marked a sharp break in local ceramic traditions, with subsequent styles owing more to the common center (Huari?) than to the styles which flourished in the areas in question before the Tiahuanaco horizon break. There is also a difference, however, for nothing directly comparable to the Epigonal style of the coast has yet turned up in the highlands.

The expedition's work makes very clear one feature of the Tiahuanaco horizon which has attracted little attention. In pottery, at any rate, there is not one homogeneous Tiahuanaco style, found all the way from central Bolivia to northern Peru, but a series of related styles, easily distinguishable once one's attention has been called to them and probably not all strictly contemporary. There is the Tiahuanacoid style of Huari and Pacheco, with imitations all along the Peruvian coast; Epigonal, so far reported only on the coast but probably originating somewhere in the sierra; Pucara, at the north end of the Titicaca basin; and Bolivian Tiahuanaco, of which at least 2 phases can be identified (Bennett distinguished three, but his distinction between Classic and Decadent may be purely typological). The common stylistic element in this group of related styles must have been invented in one of them, or in another yet undiscovered, and diffused to the rest. Where did it start? We cannot answer this question yet, but its mere formulation marks a long step forward from the traditional assumption that of course it started at Tiahuanaco where it first attracted the attention of scholars.

The Tiahuanaco horizon in Peru may well represent a military conquest, as has often been suggested. Certainly the homogeneity of Tiahuanacoid Huari pottery which appears intrusive in local sequences throughout southern Peru suggests a parallel with the homogeneity of Inca pottery in the same area. If a conquest state is indicated, however, it is most unlikely that the capital was at Tiahuanaco, or indeed that the Titicaca basin was ever included in the same state with Cuzco and Nazca on this horizon. The most likely candidate in our present state of knowledge is Huari, which is the largest and most spectacular site where the right kind of pottery is found.

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University of California
Berkeley, Calif.
October, 1955

CERRO MANGOTE: A PRECERAMIC SITE IN PANAMA *

Charles R. McGimsey III

UNTIL about 25 years ago nearly all that was known of the prehistory of Panama was the result of careful studies based on somewhat haphazard excavation (MacCurdy 1911; Holmes 1888). Almost without exception detailed and often gross provenience data were completely lacking. This unhappy situation was attacked in the late 1920's by Linné (1929). Beginning in the 1930's Lothrop succeeded in outlining and describing a number of culture areas covering most of Panama's Pacific watershed (Lothrop 1937, 1942, 1950). These areas of necessity reflected only the broad picture at the time of and immediately preceding the initial Spanish entradas for, although it was to be assumed that there was internal variation within each of these areas and considerable time depth for the country as a whole, no data on this were available. In the last few years work by the Smithsonian Institution and by Peabody Museum, Harvard University, has added to this picture. In general only the preliminary reports on this work have yet been published (Sterling, 1949, 1950, 1952; Willey and Stoddard 1954) but a small beginning has been made toward an understanding of the prehistoric developments within the region with the documentation of the Monagrillo culture located on the shore of Parita Bay in western Panama (Willey and McGimsey 1954). This culture predated by an unknown span of time the cultures with polychrome pottery typified by Sitio Conte. It had relatively simple plain pottery and depended in large part on the sea for food rather than on agriculture.

During the first half of 1955 the author undertook a program of survey and test excavations in southwestern Panama with a view to broadening this geographical and temporal picture. Some 50 sites were located during this survey and test excavations were made in approximately half of them. Cerro Mangote (Co-40) is one of these sites.

The Site

The Rio Santa Maria is one of the largest of the many rivers in Panama. It drains the central section of Veraguas Province and along its lower reaches forms the border between the Provinces of Coclé and Herrera before emptying into the gradually shelving, silt-filled Parita Bay some 150 km. southwest of Panama City. Ten km. above the mouth of the river on the north or Coclé bank lies Cerro Mangote, the first of a series of 3 hills. Cerro Mangote, the largest of the three, is nearly 1200 m. in length (east-west), 250 m. wide, and 45 m. high. The second hill, Cerro Girón, is separated from the first by only 300 m. while the third and smallest is immediately adjacent to the second. On the south slope of Cerro Girón and on the flat land between the hill and the river are located the shell and refuse middens of the Girón Site (Co-2), a large pre-Coclé, polychrome pottery site (Willey and Stoddard 1954).

Between these hills and the sea there is a flat expanse of grass covered *potrero* and vegetationless tideland or *alvina*. A heavy growth of mangrove borders the present coast and

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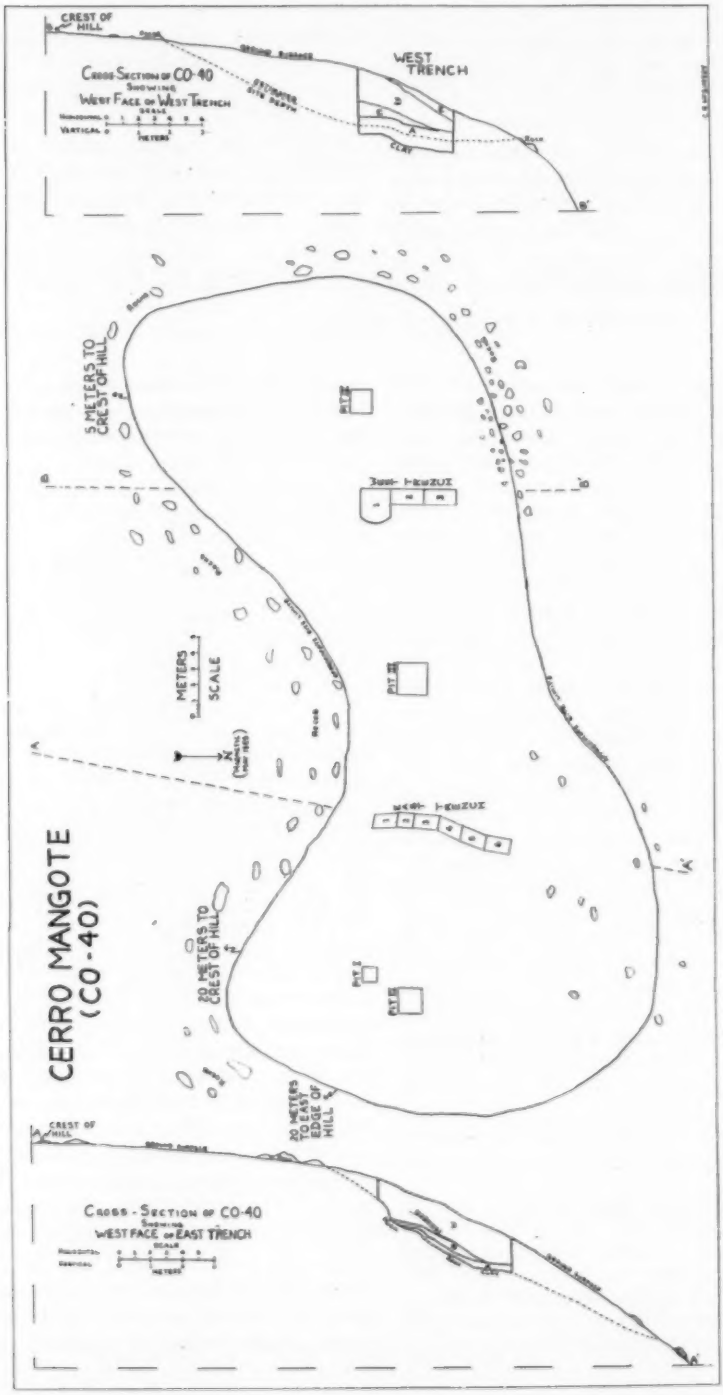

FIG. 1. Map of Cerro Mangote site, with cross sections showing excavations.

occurs in small linear patches in the potrero. There is evidence that at one time the shore of Parita Bay closely approached these hills and that the shore has gradually retreated during the Recent through a process of offshore bar formation and lagoon silting (see Willey and McGimsey 1954: 29-30).

The site itself is a shell midden located on the east end of the north slope of Cerro Mangote just below the hill's crest. The presence and dimensions of the site can be traced only by the considerable number of shells on the surface of the ground and, in its deeper portions, by a hollow sound under foot (much the same effect as that given by a deep deposit of pine needles and humus). It is probably to this latter characteristic that we owe the discovery of the site, for the sound effects rather than the presence of shell were described by local informants when inquiry was made about sites in the area. Prior to our visit we were, in fact, dubious as to the existence of a prehistoric site for the description of "a large area where the ground sounds hollow" seemed to be in the same category as the persistent Panamanian story of the rich Indian graves to be found just below a floating blue light which is generally seen late at night.

The site is not impressive on first view for the entire hill is covered with a dense growth. Certainly other than its possible archaeological interest the site had little to recommend it as an area in which to work for this growth included a high proportion of nettles and thorn trees, the latter of the type infested by biting ants. In addition there appeared to be somewhat more than the usual quota of objectionable animal and insect life. Nevertheless the presence of large quantities of shell, the somewhat unusual location of the midden atop a sizeable hill, and the puzzling lack of sherds seemed to warrant a brief check. The one day set aside for making a few tests was rapidly extended and work was stopped after 6½ days only because our over-all program called for the investigation of 10 other perhaps equally important sites before the beginning of the rainy season brought all work to a halt.

The area covered by the midden is roughly the shape of an hourglass. It extends west along Cerro Mangote from a point 20 m. from the east end of the hill for a distance of approximately 55 m. The bulbous ends of the deposit begin 5 to 20 m. north of and 1 m. below the crest of the hill and extend down the slope for approximately 25 m. The surface of the ground drops as much as 5 m. over this distance. In its center the site narrows to little more than 13 m. in width. The depth of the deposit between the centers of the 2 bulbous ends appears to range between 1 and 1½ m. though in portions of the western end the deposit is nearly 2 m. deep. The midden thins out rapidly at the edges. In all, the site contains an estimated 1000 cu. m. of material, 30 cu. m. of which were excavated.

The Excavations

Two trenches and 4 pits were opened. The 2 trenches ran north-south through the 2 wide portions of the site. The pits were scattered, two on the east end of the site, one on the west end, and the fourth in the constricted central portion.

The West Trench was 6.00 m. long and 1.00 m. wide for the northern 4.00 m. The southern 2.00 m. were expanded to 2.00 by 2.25 m. in order to clear a skeleton. In the northern half of the trench there was a triangular stratum of almost pure oyster shell (*Ostrea chilensis* and *Ostrea mexicana*) extending from the surface at about the midpoint of the trench to a depth of 30 cm. at the north end. From the surface to 95 cm. in the south and from 30 to 60 cm. in depth in the north the excavation went through a deposit of loose gray-brown soil, shell fragments, whole shell, and a considerable number of head-sized boulders. Crab (*Menippe frontalis*) was the most numerous shell, but there were occasional lenses of oyster. Other shell present in small numbers included: *Protothaca grata, Anadara grandis, Periploma planiusoula, Iphilenia altior, Littorina varia, Thais kiosquiforma, Cerithedia valida,* and *Melampus trileneatus*. Below this level was a lens of nearly pure crab 50 cm. deep in the south half but tapering out in the northern third of the trench. Most of the other species were also present but in very small numbers. The lowest deposit consisted of about 25 cm. of shell and shell fragments. *Ostrea, Protothaca grata,* and *Scapharca tuberculosa* were almost equally numerous; *Menippe frontalis, Cerithedia valida, Cadium ringens, Alaba jeannette,* and *Anadara grandis* were present in small numbers. The soil of this level was reddish brown, moderately compact, and clayey. The stratum graded into hard red sterile clay at a depth varying from 1.80 m. in the south to 0.90 m. in the north.

The East Trench was 1.00 m. wide and 8.50 m. long. The first 80 to 100 cm. went through loose gray-brown soil with occasional boulders and a large component of whole and fragmented shell. The shell was primarily crab and oyster with the bivalves *Scapharca tuberculosa* and *Protothaca grata* forming the main minority species. Most of the species found in the second level of the West Trench were also present. Through part of the lower portion of this stratum and on occasion separating it from the stratum below was a thin layer of gray coquina

consisting of solidified sand, shell, and gravel . Extending over the southern ¾ of the trench at an average depth of 1.00 m. was a level 10 to 30 cm. thick of loose light brown soil and shell. About half of the shells in this stratum were oyster while the remainder were crab and the small bivalves such as *Cerithedia valida* and *Littorina varia*. The lowest level consisted of compact reddish clay, shell, and shell fragments. Oyster predominated with *Protothaca grata* considerably less frequent. Crab and a few other species were present but numerically minor. This stratum gave way to sterile red clay and rock at a depth of 1.10 to 1.30 m.

Pit I, 1.00 m. square, and Pit II, 1.50 m. square, were located a few meters north and south of one another about halfway between the East Trench and the east end of the site. The first 40 to 50 cm. in both pits consisted of loose brown soil, shell, and shell fragments. *Ostrea chilensis* and *Ostrea mexicana* were the major species with *Menippe frontalis* second; *Protothaca grata, Scapharca tuberculosa, Thais kiosquiforma, Donax asper, Littorina varia,* and *Cerithedia valida* were present in small numbers. Below this to a depth of 70 cm. in Pit I and 110 cm. in Pit II there was reddish soil, still loose but gradually becoming more compact with increased depth. Oysters were by far the major species though not the only shell present. In both pits rock prevented further excavation.

Pit III, a 2.00 meter-square pit, was located midway between the 2 trenches in the constricted central portion of the site. The first 110 cm. were very loose, gray-brown sandy soil, shell fragments, some whole shell, and occasional boulders. The shell was principally crab with oyster much less frequent. Most of the species found in the trenches were present as well as a few *Galeodus patula* and *Murex regius*. In the next 50 cm. the soil was lighter in color and the shell was more fragmented. *Menippe frontalis, Ostrea,* and *Protothaca grata* were about evenly represented and most species found elsewhere in the site were present including an unusually large number of *Littorina varia* and *Natica unifasciata*. From 1.60 to 1.70 m. the soil was a reddish clay with oyster, some crab and *Protothaca grata,* and a few other species. Below 1.70 m. there was sterile red clay and rock.

Pit IV, 1.50 m. square, was located halfway between the West Trench and the western end of the site. The first 60 cm. were loose brown sandy soil with about equal proportions of crab, oyster, and *Protothaca grata*. The next 10 cm. were reddish clay with oyster and occasional crab, *Protothaca grata, Scapharca tuberculosa,* and a few other species. This stratum graded into sterile red clay.

In summary, the initial deposit (Stratum A) which covered the entire site was a thin one with oyster as the principal shell. The succeeding stratum (Stratum B), a deposit of oyster, crab, and small bivalves in nearly equal proportions, is found in all of the pits to a depth of approximately 50 cm. This second stratum is unusually thin (10 to 30 cm.) in the East Trench and does not cover the entire area of the trench. In the West Trench it is completely absent being replaced (though the exact time relationship is unknown) by an equally deep deposit (Stratum C) consisting almost exclusively of crab shells. In the central portion of the site covering at least the 2 trenches and the area between them but not extending to the lateral pits is a deposit (Stratum D) nearly 1 m. deep with crab as the principal constituent. Small bivalves and oysters are numerous, the latter occasionally occurring in small lenses. This stratum is the last major deposit but in the north end of the West Trench there is a final deposit (Stratum E) of almost solid oyster shell.

Nearly 1000 animal bones were recovered, of which approximately half were sufficiently complete to be identified in a general way but a lack of comparative skeletal material prevented precise identification. The following forms are represented: Panama White-Tailed Deer (*Odocoileus chiriquensis* Allen), a small mammal which is probably Chiriqui Collared Peccary (*Pecari angulatus* ?subsp.), Raccoon (*Procyon* ?sp.), and perhaps a few others, small toothed whale, sting ray, turtle, fish, and bird. The animal bone does not reflect the changes shown by the shells. Instead, the number of bones and the proportions of the various forms remain almost constant throughout the site. In general terms the deer constituted approximately 40% of the bone present, small mammals 25%, turtle 15%, bird 10%, fish 5%, and other forms 5%. Because of the size and perishable nature of fish bones the above figure probably does not adequately represent the importance of this element in the diet.

The Artifacts

The stone artifacts from Cerro Mangote are simple in nature and, although the projectile points, axes, and elaborate metates of the later cultures are absent, a variety of forms does occur. In addition to pebble grinders and choppers, there are pebble manos, basin metates, pounders, flakes, and other possible artifacts such as stone balls and discs.

Stone artifacts occur at Cerro Mangote with far greater frequency than has been recorded from any other site in Panama. A comparison between Cerro Mangote and the Monagrillo mound (He-5) (Willey and McGimsey 1954) shows that more utilized stone (236 whole and fragmentary pieces) came from the 30 cu. m. excavated at Cerro Mangote than from the approximately 700 cu. m. removed at Monagrillo (230 pieces). Even the pebble choppers and grinders, the most characteristic tool of the Monagrillo culture, occur with greater relative frequency at Cerro Mangote. If, for purposes of comparison, it is assumed that all of the pebble grinders and choppers found on the surface of He-5 were associated with the 2 upper levels (Strata 7 and 8) where the greatest pop-

ulation concentration occurred there would be an average of one grinder or chopper for every 4 cu. m. of those levels excavated, whereas at Cerro Mangote an average of two were found in every 3 cu. m. removed.

None of the flaked stone exhibits secondary chipping and none of the other tools were intentionally modified except for the changes brought about through use. No ground stone tools were present.

The flakes and cores are largely of petrified wood though jasper and chalcedony also occur. The larger tools are all dark, dense, igneous rocks both fine and coarse grained. The fine grained specimens predominate. All of the materials used can be found abundantly in the vicinity of the site. The larger tools were made principally from waterworn cobbles not unlike those to be found along the shore and in the river beds today and small pebbles of chalcedony and related materials can be found there as well. Pieces of petrified wood, often of considerable size, are frequently seen on the surface of the ground and in the river beds.

As discussed in the description of the excavations it is possible to delineate strata at the site on the basis of the percentage variation of shellfish present as well as by soil changes. No correlation between these levels and any artifact categories could be detected in the present sample. In fact, no horizontal or vertical differentiation could be observed in the artifact inventory but it is quite possible that more extensive excavation would reveal the presence of some temporal variation in the artifacts utilized.

Pebble Grinders and Choppers. A total of 26 pebbles had been used for chopping and/or grinding. Of these, three had been used solely for chopping, four had been used for chopping and later for grinding, and the remainder exhibited grinding facets only. These pebble choppers and grinders from Cerro Mangote are identical in every respect with those associated with the Monagrillo culture.

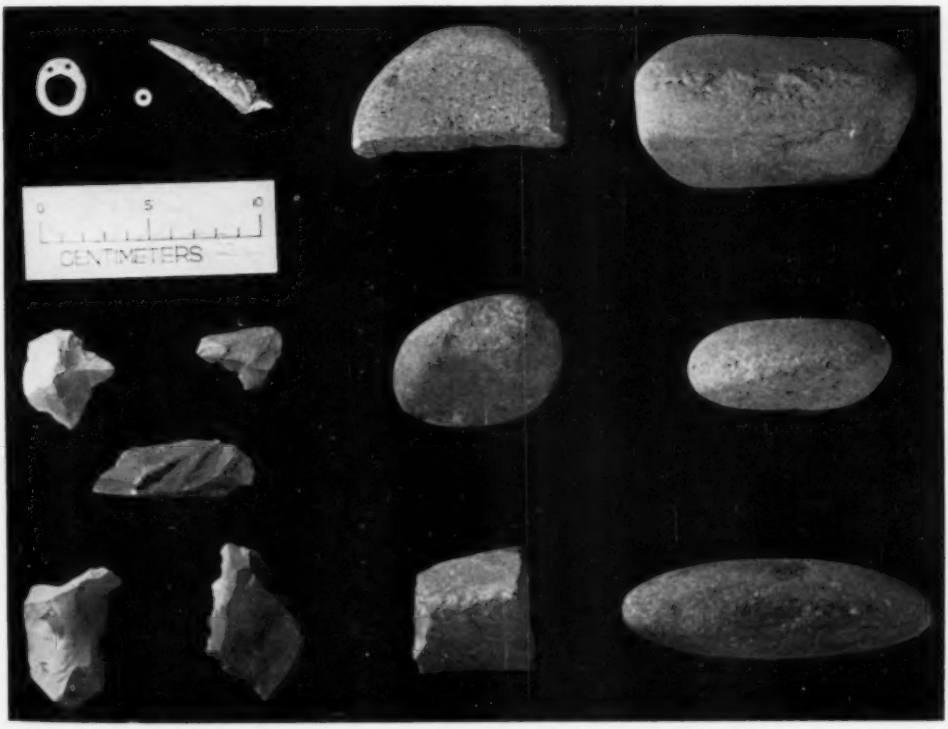

Fig. 2. Artifacts from Cerro Mangote. *Upper*, shell pendant, shell bead, bone awl, pebble mano, and triangular pebble grinder with 3 edges used; *middle*, 3 stone flakes, pebble pounder, and small oval pebble grinder with one edge used; *lower*, 2 stone flakes, fragment of triangular pebble chopper, and oval pebble chopper-grinder.

The pebbles employed were roughly oval or triangular in cross section and in every case an edge running parallel to the long axis of the rock was utilized. While this is natural enough for a chopper, the deliberate choice of a narrow elongated ridge rather than a flat surface (which generally was available on the same stone) for grinding is less easily explained. Pebble manos (stones employing a large flat surface for grinding) were known and employed (see below). Probably the pebble grinders served some separate purpose, perhaps one related to the preparation of large quantites of shellfish for consumption. The fact that this tool type is associated with the Monagrillo and Mangote cultures, both of which depended heavily on shellfish, but not with the later agriculturally oriented groups lends some weight to this hypothesis.

Two of the 3 choppers are triangular in cross section while the third is ovoid. The 2 nearly complete specimens (one triangular and one ovoid) are subrectangular in outline. In each case only one edge had been utilized. This edge was battered and exhibits rough concoidal fractures where flakes were dislodged during use. The average dimensions are 15 by 8 by 5 cm.

Three of the 4 chopper-grinders are triangular in cross section and subrectangular in outline while the fourth is turtle-backed in cross section and oval in outline. On all four one edge had been used for chopping and later this same edge had been used for grinding so that the fractures resulting from the chopping action were partially obliterated. On the turtle-backed and on one triangular specimen a second edge had been used solely for grinding. The average dimensions of the triangular chopper-grinders are 14 by 7 by 5 cm., while the turtle-backed specimen is 13 by 8 by 4 cm.

Only one edge had been used on 14 of the 19 pebble grinders, 2 edges had been used on 3 specimens, and 3 edges on one triangular tool. The remaining grinder is unique. It is subrectangular in outline and roughly circular in cross section (dimensions: 12 by 5.5 cm.). All faces appear to have been used for grinding so that the surface is simply a series of adjacent grinding facets running the length of the stone and blending more or less smoothly one into the other. All but 4 of the others are triangular in cross section and those which were sufficiently complete for the outline to be determined are subrectangular. Their dimensions range from 8.5 by 4.5 by 3.5 cm. to 14.5 by 8.5 by 7 cm. Three of the remaining four, on which only one edge had been used, are turtle-backed in cross section and oval in outline. They are smaller than most of the triangular specimens, averaging only 8.5 by 7 by 3.5 cm. The final specimen was turtle-backed in cross section and circular in outline (10 cm. in diameter with a maximum thickness of 4.7 cm.). Both the flat surface and one edge had been used for grinding so that this tool served as a pebble grinder and as a pebble mano.

The grinding facets on all pebble grinders average between 1 and 2 cm. in width and are from 6 to 12 cm. long. The facets are slightly convex in both directions. The curvature is fairly uniform over the short dimension but in the long dimension most of the curvature occurs at the extremities. It would appear that the grinders were used in conjunction with the shallow-basin metates found at the site.

Pebble Manos. Including the artifact described above which also served as a pebble grinder, 9 pebble manos were recovered. Seven of these consist of a naturally round flat basaltic pebble of coarse texture. One or both flat surfaces were used for grinding. Both faces of 4 manos had been used and in 2 instances considerable wear was exhibited. One specimen appeared to have served also as an anvil stone. In size they ranged between 9 and 11 cm. in diameter and between 3 and 5 cm. in thickness. The grinding facets are slightly convex but as on the grinders most of the curvature occurs on the outer edges of the facet. Probably the pebble manos and pebble grinders were used on the same or similar metates.

The texture and appearance of the remaining 2 manos differ somewhat from the above and they may have served a different purpose. Both are angular fragments of fine-grained basaltic rock, one face of which has been worn flat and smooth. Because of the nature of the rock these use facets instead of being somewhat rough appear highly polished. In size they are 9 by 6 by 3.5 cm. and 7 by 4 by 3.5 cm. although this latter may be only a fragment.

Metates. Fifteen complete or partial shallow-basin boulder metates were recovered. They consist of large, generally subglobular, coarse-grained basaltic boulders unmodified except for the grinding area which occurs on naturally flattened surfaces of the rock. Almost any available rock of sufficient size with a suggestion of a flat surface appears to have been used. They range in size from 40 by 30 by 20 cm. to 25 by 25 by 10 cm. The grinding area itself is nearly circular and ranges from 10 to 20 cm. in diameter, though in one instance it is somewhat elongated (25 by 15 cm.). The edge of the grinding area extends to the edge of the boulder in only 2 instances, in the remainder it is more or less centrally located on the natural flat surface. There was no indication that the flat surfaces had been modified in any way except as a result of the actual grinding and none appeared to have been "resharpened" by pecking. One metate was somewhat aberrant in that it was a slab-shaped rock (45 by 37 by 12 cm.) and both flat surfaces had been utilized for grinding. The greatest depth of the grinding area on all the metates ranged between 0.5 and 1.0 cm. with the exception of the largest specimen which had been worn to a depth of 2.0 cm. This metate was also one of the two on which the basin extended almost to the edges of the boulder.

Pebble Pounders. Eight pebbles of irregular shape ranging in size from 7 by 4 by 3.5 cm. to 12 by 6 by 5 cm. had been used sufficiently as pounders to permit their ready recognition. Doubtless many other rocks were so used but without resulting in sufficient modification of the pounder to make recognition possible. On all speci-

mens the pounding had been restricted to one small area, generally an end. On one of the smaller pounders a side had been used.

Flakes and Cores. Flakes and cores were numerous (164 specimens) throughout all levels of every excavation. Most are of petrified wood although some jasper and chalcedony are present. In general the material is of poor quality. That is, it tends to fracture in an irregular and unpredictable manner. Other than the initial removal of the flake from the core, probably by percussion, there was no recognized attempt to modify the form nor any observed uniformity or pattern to the flakes themselves. Neither do the cores show any evidence of having been deliberately prepared.

If more complex artifacts of chipped stone had been encountered the majority of these flakes would doubtless be described as flint scrap but in the absence of any more complex forms the flakes themselves must be assumed to have been the artifacts desired and used. Sometimes, but not always, use chips could be observed along the sharp edges of the flakes.

The flakes varied considerably in size and shape but on an average their dimensions ranged around 4 by 2 by 0.5 cm.

Other Stone. In addition to the stone tools described above, more than 25 small naturally round or ovoid stones ranging in size from 8 by 5 cm. to 4.5 by 3.5 cm. were found, as well as 2 flat natural discs which were 8 to 10 cm. in diameter and 1 to 1.5 cm. thick. There was no discernible modification of these stones but they do not occur naturally on the hill so it is probable that the occupants of the site brought them there. As the round stones occasionally occurred in groups of four or five and several appeared to have been subjected to considerable heat perhaps they were utilized for some purpose such as stone boiling. They could also have been used to pound materials too soft to permanently scar the pounder. The flat disks would have made admirable anvil stones or could have been used to pound meat much as a modern cook uses the side of a plate.

There was one other stone ball of red-brown igneous material about the size (2 cm. in diameter) and appearance of a marble. It is very smooth, well-polished, and almost perfectly round.

Finally, there were 5 pieces of hematite. The largest is 4.5 cm. in diameter and the smallest is approximately 3 by 2 by 2 cm.

Bone. Bone was well-preserved in the Mangote shell midden and a considerable quantity was recovered. Despite this only 5 fragments of worked bone were found, all of them probably portions of awls. One form, an awl or possibly a flaker, though the ends were not scratched and scarred, was constructed from the antler of a deer. The shafts had been smoothed slightly and the ends brought to a sharp point. The antlers had apparently been broken from the skull rather than cut free. Two of the 3 specimens of this type came from deep in the West Trench while the third, a nearly complete example, came from deep in the East Trench. One of the other 2 pieces consisted of a central portion of a split deer metapodial while the other was the long bone of a bird. These pieces had been smoothed and well-polished but in neither case was the specimen complete enough to determine with assurance whether it represented a form of awl or some other implement.

Shell. Although shell was the most abundant material present only 2 intentionally modified shell artifacts were encountered. One, a shell bead, is well-smoothed and biconically drilled. It is 0.2 cm. thick with a diameter of 0.8 cm. while the diameter of the hole is 0.2 cm. The bead came from the general area of one of the 6 human skeletons found at a depth of between 40 and 60 cm. in the central portion of the East Trench. Whether the association was accidental or in the nature of a grave offering could not be determined. The second artifact, probably a pendant, came from the same area but was 10 to 15 cm. deeper than the deepest skeleton and may well not have been associated with the burials. This shell disc is about 2.5 cm. in diameter and 0.2 cm. thick. A hole 1.4 cm. in diameter had been cut through the disc slightly off center and 2 additional holes 0.2 cm. in diameter had been drilled, 1 cm. apart, through the broader remaining margin.

With pottery unknown it is probable that in addition to these shell artifacts other shells such as the large *Anadara grandis* and perhaps even the larger conches were used as receptables. No such shells had been discernably modified, however, no modification would be necessary for them to serve such a purpose adequately. Two *Anadara grandis* shells, each capable of holding better than a half cup of liquid, were found near the right side of one of the flexed skeletons. If this association was intentional it would certainly suggest their use as receptacles.

Burials

A surprising number of burials, 12 in all, was encountered, and because the bones were surrounded by a heavy deposit of shell, preservation, while not perfect, was quite good. The skulls were generally crushed or badly cracked and some of the bones, particularly the more fragile elements, were in poor condition; but in general the bones could be excavated readily and handled without fear of sudden disintegration even though in some cases they lay no more than 40 cm. below the surface. All 12 skeletons came from the 2 trenches, six from between 40 and 60 cm. and the remainder from between 100 and 150 cm. In addition more than 100 miscellaneous human bones or fragments were found scattered throughout all pits and levels.

There were 2 types of burial. The first and most interesting was a form of secondary bundle burial. Ten of the 12 bodies had been so treated. The entire body was contained in a sharply delineated rectangle approximately 50 cm. long and 30 cm. wide. The bones appear to have been placed in a flat rectangular container, possibly a basket. The skull was in the center of the north end of

the rectangle in 7 cases (in the other 3 the skull was oriented to the east and the following description should be adjusted accordingly). The long bones were evenly divided and placed parallel to one another along the east and west sides. Apparently no attempt was made to keep the bones from one side of the body together. The vertebrae and miscellaneous foot and hand bones appear to have been placed in the center. The pelvis was at the south end opposite the skull, while the ribs were placed on top of the long bones overlapping in the center. Five of these bundle burials with head to the north were lined up in a neat row running east-west across the center of the East Trench (the trench was widened at this point) at a depth of 40 to 60 cm. Another with the skull to the east was nearby. The remainder of the 10 bundle burials were below 100 cm.

The other 2 burials were flexed. The body was placed on its back with the head to the south and turned slightly to face the east. The legs were drawn up with the knees to the east side. The upper arms were parallel to the body, and the lower arms in one case were crossed over the stomach with the hands just above the pelvis, and in the other the lower arms were placed over the chest with the hands just under the chin. These burials were both more than 1 m. deep and one was immediately adjacent to 2 bundle burials.

There was no good evidence that artifacts accompanied these burials. While cleaning above and around one bundle burial a single shell bead was encountered and on the right side near the head of one of the flexed burials there were 2 large *Anadara grandis* shells which could have served as receptables. In neither case could the association be accepted as definite.

There is one further point of interest with respect to the skeletal material. The bones of the bundle burials are scratched and scarred to a much greater degree than were the animal bones at the site and the bones of the flexed burials do not exhibit this characteristic at all. These scratches could have occurred through the action of birds and animals if the bodies were exposed, although observation of skeletons of cows and of other animals similarly treated today did not reveal any such scars. Also, the larger animals which would have been most likely to inflict such marks probably would have scattered the bones, yet few of the large bones were missing. The marks could also have been inflicted after interment through the action of rodents but the bones do not ap-

Fig. 3. Bundle burial and adjacent flexed burial, from East trench, Section 5, depth 130 cm., at Cerro Mangote.

pear to have been disturbed. It seems possible that the flesh was stripped from the bones shortly after death by the other members of the group. The crude stone implements could easily have inflicted the damage. The flesh from the animal bones on the other hand while perhaps similarly treated may have first been softened by cooking and/or removed by the teeth rather than solely by a stone knife or scraper so that the marks would be less evident.

Discussion

The major point for discussion is whether or not the site is truly preceramic, since absence of pottery does not alone prove that a group did not practice the ceramic art or was not contemporaneous with nearby pottery making groups. As a matter of fact 5 sherds were encountered at the site. Four of these, all from a large necked jar with a red slipped lip of a type quite common in nearby polychrome pottery sites, came from on and immediately below the surface of Pit IV. The fifth sherd, of the same type as the others, was first seen in the dirt being thrown out of the 135 to 150 cm. level of Pit III. The soil of Pit III was extremely loose and sandy and the workmen climbed in and out of the pit twice during the excavation of each level. There is no question in my own mind but what the association of this sherd with this depth is entirely accidental; and that the sherd, along with dirt and much dust, dropped to that level from on or very near the surface simultaneously with one of the workmen.

Ignoring for a moment the nature of the stone inventory which is totally unlike that of any of the known pottery bearing sites other than Monagrillo, it seems highly unlikely that the site could represent a shellfishing station of pottery making people permanently located elsewhere. Such a suggestion might be based on the assumption that since the shellfishing expeditions would be temporary in nature no fragile artifacts such as pottery would be brought along. Such a supposition, however, goes against all the available evidence for this section of Panama. A large number of shell middens representing a wide time range have now been surveyed along the Bay of Parita (Willey and McGimsey 1954, and by the author during the 1955 field season), some so small as to contain considerably less than 1 cu. m. of material; yet at all of these sites it was possible to pick up 20 to 30 sherds even without excavation. At Cerro Mangote 30 cu. m. were excavated and carefully searched, yet only 5 sherds were recovered, all probably from on or very near the surface.

It is also difficult to conceive of the site as that of a culturally impoverished group living contemporaneously with pottery making people. The area around the site was one of the most popular and most densely populated throughout the known prehistory of Panama. A complete lack of intercommunication and trade within such a small, heavily populated, and easily traversed region while perhaps not impossible would certainly be surprising and would require considerable evidence for proof.

If there was any evidence other than the occurrence of 5 sherds of dubious contemporaniety to indicate that the site was nonceramic rather than preceramic there might be some justification for serious consideration of the possibility, but there appears to be none. The location of the site, the diet, the artifact inventory, particularly the pebble tools, and the lack of pottery in positive association all point to the site's preceramic nature.

Up to this time the Monagrillo culture was the earliest reported from Panama. Its artifact inventory includes pebble choppers and grinders, boulder metates, roughly flaked stones, pestles, hammerstones, a stone bowl fragment, and simple pottery, generally plain but with some red painted and incised pieces. If pottery is subtracted from the Monagrillo culture the artifact inventories of the 2 cultures, while not identical, closely parallel one another. In fact the pebble choppers and grinders, the most distinctive Monagrillo artifact, are indistinguishable from those found at Cerro Mangote. In short, the material culture present at Cerro Mangote is precisely what might be predicted, from the Monagrillo cultural inventory, for a group living in the area at a time prior to the introduction of pottery.

There are differences between the 2 cultures besides a lack of pottery in one, although that is the most important single factor. Stone vessels, pestles, rectangular manos, and well-chipped flakes do not occur at Mangote, whereas round pebble manos are not a part of the Monagrillo culture. Some of the Monagrillo flaked stone is more carefully worked than anything found at Cerro Mangote. One of the most striking differences, however, is the large relative and absolute number of stone tools encountered at Cerro Mangote. There an av-

erage of nearly 8 stone tools were found for every cubic meter removed, proportionately 12 times as many as came from the Monagrillo mound (He-5).

One explanation for the sheer number of stone artifacts may lie in the fact that since the tools required only a minimum of preparation or none at all the life span of individual artifacts was less than would have been the case with artifacts whose manufacture required considerable effort. As for the greater concentration of stone tools at Cerro Mangote perhaps the family or subsistence unit was smaller. The assumption being that each subsistence unit would use its own tools thereby increasing the per capita number of tools and their concentration in the refuse. Another possibility would be the introduction or increased use of wooden implements for crushing or pounding in the Monagrillo culture. Doubtless there are other possible factors as well.

Other than the Monagrillo culture there is almost no material with which the Mangote artifacts can be profitably compared. The distinctive tool types are few, consisting solely of the pebble tools: the choppers, grinders, and perhaps the manos. The remainder of the stone tools, the crude flakes, the pounders, and the shallow-basin boulder metates, the bone awls, shell beads, and pendants have such a wide distribution in space and in time as to be almost useless for detailed comparisons. A thorough search of the literature was made for references to tools resembling the pebble choppers and grinders in connection with writing the Monagrillo report but without success. Since then there has been one find of very similar tools which would seem to have considerable significance. In the summer of 1954 Ricardo Alegría of the Puerto Rican National Museum and H. B. Nicholson of Peabody Museum, Harvard University, discovered and excavated a preceramic cave site in Puerto Rico. Willey observed the material from this site and was of the opinion that some of the tools are identical to the Monagrillo pebble choppers and grinders (since this was written a preliminary report has appeared: Alegría and others 1955). The finding of this rather distinctive tool type in a preceramic context in Puerto Rico as well as in Panama provides a tantalizing suggestion of a pre-Formative Circum-Caribbean continuity which only further research can prove or disprove.

Summary. Cerro Mangote (Co-40) is a preceramic shell midden located in the Province of Coclé in western Panama. It is situated atop a small hill on the north bank of the Rio Santa Maria. At present the sea lies 10 km. east of the site but a study of the coast line and its changes made in connection with the Monagrillo shellmound 15 to 20 km. to the south suggests that at the time Cerro Mangote was occupied the sea was considerably nearer, perhaps within a kilometer. The intervening area (now potrero) probably consisted of a shallow lagoon and/or alvina-like tidal flats such as border the sea at the present time.

The occupants appear to have relied primarily on shellfish, supplemented by hunting, for their protein and doubtless the wild fruits and seeds which abound in the area also contributed to their diet. The possibility of agriculture cannot be absolutely denied, of course, but there certainly is no evidence that it was practiced. Most of the shellfish utilized are types found in mud, in tidal flats, and around mangrove trees. The variation in the species of shellfish eaten probably reflects little more than the variation and extremely localized nature of the supply, for beds are easily exhausted. Throughout the occupation of the site crab and oyster were the most popular species and at varying times one was used almost to the exclusion of the other.

With mud flats and the sea on one hand, the river on another, and grass and woodlands reaching to the foot of the hill on the remaining sides the site was well suited to the economic needs of the occupants and apparently it was occupied more or less continuously over a considerable period of time. The site was high, which not only put it well out of reach of violent sea activity but exposed it to the cooling winds which blow almost constantly from the north during the hottest part of the dry season. This latter factor may well account for the site's location on the north slope of the hill.

The picture presented is that of a fairly permanently situated small group, almost certainly larger than a single extended family, which lived by gathering shellfish, wild plants, and some hunting. Wooden weapons and/or traps and drives may have been used exclusively in hunting for no stone projectile points were encountered. They prepared their food by grinding it on boulder metates with pebble

grinders, choppers, and manos, and possibly cooked it by a stone boiling technique. Basketry or weaving may have been known to them for the bones of their dead, stripped of flesh, appear to have been placed in some container such as a basket or net. Most but not all of their dead were so treated; others were buried on their backs in a flexed position.

How long this group existed before the introduction of pottery is not known; however, when pottery was introduced it appears to have wrought little immediate change. The succeeding Monagrillo people lived in much the same manner although they were well acquainted with ceramic techniques. Perhaps the introduction of pottery was not in itself as important as the possibly implied opening of channels of communication, however indirect, with the more advanced Formative cultures to the north and/or to the south. For along this line of communication probably flowed the ideas and even the artifacts which were to provide the stimulus which would transform the relatively simple Mangote and Monagrillo cultures into the socially, politically, and aesthetically complex groups met by the Spanish in 1516. On the other hand if it can be established that these channels of communication were already operative during the pre-Formative the transition from the Mangote culture to that of Monagrillo would probably be indicative of the invention of pottery at some point along the channel rather than simply the development of a more far-flung network of stimulus diffusion and trade.

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CHANGING LIVING PATTERNS OF THE YUCATAN MAYA

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THE PURPOSE of this paper is to review the archaeological data on the settlement patterns of the Yucatan Maya with a view to reconstructing the history of their changing way of life.

There is little evidence that the population density of the lowland Maya during their cultural heyday was substantially greater than that of the modern State of Yucatan, about 30 persons per square mile. The marked contrast between this low density and that of the Valley of Mexico, estimated at the order of 500 per square mile at the time of the conquest, suggests that low population density, at least among the Maya, did not act as a bar to the attainment of civilization.

Although the evidence of low population density is largely of a negative nature, density is clearly dependent on the carrying capacity of the land, and a careful search by Joseph Hester (Hester 1954) has failed to produce evidence of any agricultural techniques which would substantially augment the modern figure. Although the number and size of architectural structures in the area have been argued to prove a dense population, computations of time and labor required to construct the Maya religious centers demonstrate that, at a density of 30 persons per square mile, a population drawn from a radius of a few miles would have been more than adequate to construct the known architecture during the necessary time period. Although the slash and burn system of agriculture does not allow a high population density, it requires only about 60 days per year of labor from the cultivator (for a summary of Steggerda's data on this point see Morley 1946: 154-6) and thus leaves liberal time for such uneconomic pursuits as the building of temples. Conversely, this technique is well capable of producing considerable agricultural surplus, as the modern urban concentrations of Yucatan demonstrate. It is indeed possible that a food surplus and leisure time are more important prerequisites to civilization than is dense population.

Comparison of the Maya structures with those of the Valley of Mexico is significant. The largest of the Maya temple substructures has a volume of only 1/20 that of the Pyramid of the Sun at Teotihuacán, thus conforming quite closely in comparative size to the comparative population densities of the 2 areas. The amassing of temple substructures, however, requires only unskilled labor. The architectural elaboration of Maya structures argues for a larger proportion of far more specialized craftsmen than does the architecture of Central Mexico — a matter of qualitative rather than quantitative strength.

The necessity for a dispersed habitation pattern among slash and burn cultivators has long been known. The Yucatan Maya rotate land use, keeping only 1/5 to 1/6 of their land under cultivation at any time. Thus Maya farmers must live in aggregates no larger than villages to allow them to walk to their fields. The cycle of land use returns each plot to cultivation as often as every 12 years, thus making constant change in habitation uneconomical with the type of housing known to have been used by the Maya.

There is archaeological evidence that before A.D. 1000 the Maya lived dispersed in groups of no more than 50 people, and perhaps only in nuclear family groups. The survey conducted many years ago around the ceremonial center of Uaxactun (Ricketson and Ricketson 1937: 15-24) showed only 69 house ruins per square mile in an area known to have been inhabited for over 1000 years. This evidence supports the hypothesis of a low population density, and suggests that family size groups may have been the rule. Although Willey's recent survey at Barton Ramie, British Honduras (Willey, Bullard, and Glass 1955), showed 235 housemounds in a mile square area, the situation is atypical in that the area sampled was an alluvial river bottom, far richer land than characterizes the Maya lowlands as a whole.

Precisely recorded information on Maya domestic settlement patterns of the Northern area during the Classic stage is lacking, but there is a general concensus among field archaeologists (for example see Ruppert and others 1954) that in such regions as the Puuc, Chenes, and

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Chichen Itzá areas small domestic sites composed of a paved platform bordered by one to 3 mounds which probably supported thatch huts are dispersed evenly throughout the area. The picture can thus be tentatively drawn that the Classic stage ceremonial centers were the sole concentration points for a population who lived for most of the year in separated familial units on the lands which they cultivated.

The Puuc area is a particularly favorable region for the study of settlement patterns. Ceremonial architecture is extremely common and well preserved there; preservation is good because the region has been lightly inhabited for the last thousand years. The 4 largest of the Puuc sites — Uxmal, Kabah, Sayil, and Labna — have been sampled archaeologically. They extend in almost a straight northwest-southeast line, about 20 miles from end to end; Uxmal, the largest, is also the farthest separated of the group. The 4 sites are contemporary; they were occupied from about A.D. 700 to 1000. This is a far shorter time span than that found for any other of the 20 major sites sampled in Yucatan, all of which show occupations of over 1000 years in length.

Although the annual rainfall of the Puuc region is substantially greater than in the rest of western Yucatan and the agricultural potential is correspondingly high, the area is notable for the absence of available water during the 6-month dry season. In contrast to the cenote-studded north Yucatan plain, the water table in the Puuc region lies so far below the land surface that it is unavailable to the Maya; even now water for drinking is hauled into the Puuc area during the dry season. There is little question but that the building of the Puuc religious centers was made possible only by the construction of storage cisterns (Maya *chultun*). These hemispheroid, flat-bottomed cisterns have a hole at the apex, and drain the water from overlying paved platforms.

Chultuns are either excavated in bed rock, or built into the rough stone fill which underlies the plazas of the sites. According to measurements made on those mapped at Labna by Edward Thompson (1897), chultuns are quite constant in size with an average capacity of 7500 gallons. Such a chultun, according to computations of monthly rainfall and average water consumption by Maya in the area, could supply a group of from 25 to 50 persons through the year, and a single chultun thus was adequate for any habitation site. The main plaza areas of the Puuc ceremonial sites could each supply water to between 2000 and 6000 persons if in continuous occupation, and if the sites were occupied intermittently, would allow water for lime-mortar mixing (Brainerd, unpublished notes). These figures suggest that the sites could have been used for frequent religious ceremonies during the dry season, the free part of the year for a corn farmer, and so used would have supplied enough water for the people within a 20 mile radius of the sites if the population averaged not over 50 per square mile. The pottery test trenches dug off plaza slopes in these religious centers produced utilitarian ware in the main, including many cooking pots. The ceramic evidence thus suggests that the Maya camped on the main plazas as well as in the surrounding area.

Ceramic and architectural evidence indicate that the Puuc sites were abandoned suddenly, at the height of their development, with the coming of the Toltecs to Yucatan just before A.D. 1000, and that the area has not supported a residential population of any density since that time. There is also evidence that the construction of chultuns, a practise always restricted to the Puuc area, was discontinued permanently at that date. The huge Toltec period site of Chichen Itzá drew its water from cenotes as did the later center of Mayapan. It seems likely that the invading Toltecs forcibly removed the Maya population from the Puuc area, and concentrated them for easier control on the north Yucatan plain.

As Eric Thompson (1943:23) has suggested from linguistic evidence, it is probably that the concept of the residential town was a Mexican introduction. This fact has since been demonstrated archaeologically at the walled town of Mayapan where surveys recently made by the Carnegie Institution (Jones 1952; Pollock 1954) show a density of 1310 house mounds per square mile, nearly 20 times the density shown by the Uaxactun survey despite the fact that Mayapan was occupied over perhaps only 1/5 the time span of Uaxactun.

An insight into Maya conservatism is given by the Mayapan plans (Bullard 1952, 1953). Although the Toltecs seem to have succeeded in changing the Yucatan settlement pattern profoundly, the Maya homestead remained unaltered. In contrast to the contiguous walled,

concentrated towns of central Mexico, the Maya retained their isolated houses separated by garden plots, not unlike the pattern of a midwestern town in the United States. Landa describes this type of town in the 16th century, and the pattern has persisted up to the present day.

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UNIVERSITY OF CALIFORNIA
Los Angeles, Calif.
January, 1956

MEETING OF THE ARCHAEOLOGICAL INSTITUTE OF AMERICA

The 58th General Meeting of the Archaeological Institute of America will be held at the Benjamin Franklin Hotel, Philadelphia, Pennsylvania, on December 28, 29, and 30, 1956. Further details may be obtained from the office of the General Secretary, 608 University of Cincinnati Library, Cincinnati 21, Ohio.

GEORGE WALTON BRAINERD — 1909-1956

American archaeology suffered a severe loss on February 14, 1956, when George Walton Brainerd died at his home in Pasadena, California, from a heart attack induced by hardening of the arteries. His comparative youth and the complete unexpectedness of the event have made the tragedy especially shocking to the profession and to his numerous friends.

George Brainerd had at 47 already made a permanent and notable place for himself in his field and might have been expected to add greatly to his achievements during many years to come. He was born at Blacksburg, Virginia, in 1909, the son of Walton Kirk Brainerd and Margaret Smith Brainerd. His father had taught in the Agricultural Departments of West Virginia University and Virginia State College, and was serving with the Department of Agriculture in Washington at the time of his death, when George was 5 years old, and the latter thereafter lived with his mother at Martins Ferry, Ohio, until entering college.

(continued on next page)

He received his bachelor's degree from Lafayette College in 1930, and his M.A. and Ph.D. degrees from Ohio State University in 1935 and 1937 respectively. Although George's academic studies had been in the field of zoology, he never pursued that discipline professionally, but became increasingly absorbed in anthropology. From 1930 to 1934 he taught at the American Boys' College (now called Elborz College) in Teheran, Iran, and during that period worked at Tepe Hissar and under Erich Schmidt of the University Museum of Pennsylvania at Rayy. He also supervised the construction of the first scientific laboratory building in Iran. It was these experiences that kindled a deep and enduring interest in archaeology.

On his return to the United States he worked on technical studies in ceramics at Ohio State University and also joined the staff of the Rainbow Bridge-Monument Valley Expedition, with which he was field archaeologist for 3 summers, in the excavation of Pueblo remains in the Marsh Pass area of Northeast Arizona. This work was codified in a report in which he collaborated as a joint author during the winters of 1937-38 and 1938-39. During the same period he also worked on the animal bones from Fort Ancient, Ohio, and was for one season a member of the Awatovi Expedition of the Peabody Museum of Harvard.

During 1939 he was a regional supervisor of a W.P.A. archaeological project in Tennessee, and later that year joined the archaeological staff of the Carnegie Institution of Washington and began that part of his career which was to prove the most productive and significant.

His work had come to the notice of A. V. Kidder of the Institution, who saw in him a man capable of carrying forward the study of Yucatan pottery begun by George C. Vaillant and continued by Henry B. Roberts. At that time a vast collection of sherds had been assembled but still required systematic study and correlation. He attacked this problem with his usual vigor, and after 6 weeks of preparation with Anna O. Shepard, set out for Yucatan.

For more than a year he worked in the field, where he displayed not only a great capacity for accomplishment but also a remarkable ability to enlist the loyalty and cooperation of others. His ingenuity and imagination were shown in many ways: by the invention of instruments to measure hardness of pottery, to calculate vessel sizes from sherds, and by his clear grasp of a very complex problem and his capacity to marshal an overwhelming mass of data.

In 1941 he went to Cambridge, Massachusetts, where he worked on his Yucatan report, interrupting this effort by small excavations in Yucatan for the purpose of filling the gaps that appeared in the ceramic sequence that he was developing. Following an interval of war service he returned to Yucatan, and with Robert E. Smith and Karl Ruppert excavated in the Rio Bec and Chenes areas, followed by several months of laboratory work in Merida. On the basis of the information thus assembled, he formulated a time sequence divided into 14 periods from before the time of Christ to the Spanish colonial period. The report on this whole problem of Maya ceramic chronology and the relationships between the Northern and Southern parts of the area has been prepared for publication and will undoubtedly become one of the basic works in Maya archaeology.

During his first stay in Yucatan, George married Katharine Babcock of Los Angeles, who survives him, together with 4 children: John Kirk, Margaret Elizabeth, Katharine Anne, and George Ware. During World War II he served in the Special Devices Division of United States Naval Intelligence in Washington, in China, India and Ceylon, and at Brookhaven Laboratories, with the rank of Lieutenant. In that period his varied interests and ingenuity were again demonstrated by his invention of a lens to correct for distortion of the image on a radar screen and of a device by which oblique photographs could be rectified for use in aerial mapping.

Upon separation from the Navy in 1946 he assumed the dual roles of Assistant Professor (later promoted to Associate Professor) of Anthropology at the University of California at Los Angeles and of Staff Archaeologist at the Southwest Museum. The burdens of these tasks did not, however, prevent his continued field research in archaeology, and he spent several seasons in the Valley of Mexico under the auspices of the Museum, the University, and the Carnegie Institution. He was actively planning another excavation in Tepic at the time of his death. He also lectured as Exchange Professor in 1954 at Universidad Autonomia de México.

His activities were not limited to Middle America, however, for he devoted much time also to archaeological problems in California,

including a re-examination of the Lake Mohave sequence and the supervision of an exhaustive bibliography of Southern California archaeology and ethnology. He was one of the founders and first president of the Archaeological Survey Association of Southern California, and acted at various times as president of the Southwestern Anthropological Association, the Southern California Society of the Archaeological Institute of America, the Western Branch of the American Anthropological Association, and as a member of the editorial board of the University of California Publications in American Archaeology and Ethnology.

In addition to numerous published articles his major contributions to the literature have been the unpublished report on Maya ceramics and his preparation of a third edition of Sylvanus G. Morley's *The Ancient Maya*, which was fortunately completed before his death. This excellent revision will bring up to date one of the great classics in its field.

The foregoing summary of the professional achievements of an active and useful life is impressive enough. But it is quite inadequate to portray the warmth and strength of the human personality. George Brainerd was vastly more than a capable scholar and an efficient workman. He was an inspired and inspiring teacher, endowed with scholarly devotion, a remarkable memory, great technical competence, unfailing humor, patience, and insight, whose influence on his students will long survive him. He was a dependable companion under all circumstances, as I can testify from the experience of 3 intimate seasons of association in the field, 2 seasons of daily collaboration in laboratory research and writing, and almost 25 years of sustained friendship. He was independent but at the same time truly and unselfconsciously altruistic, and instinctively followed a principle of doing what he felt to be right without concern for self-aggrandizement in the eyes of others. Perhaps his charm was due to the fact that he had come to terms with himself and with life.

I am sure that I speak for an unnumbered host of people of all ages and in many walks of life in saying that he cannot be replaced in my own memory or theirs. Perhaps our mutual feelings can be most simply and effectively summed up in the estimate of one of his Maya workmen in Yucatan — that he was *muy caballero*.

WATSON SMITH

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FACTS AND COMMENTS

"EACH TO THE OTHER"

There has been, of late, much ado in archaeological circles about amateur and professional relations. Actually, there is no new problem here; there has always been an area of strain as well as an area of amicable cooperation between these groups. The tension, it is true, grows more acute with the rapid decrease in number of good sites and is, therefore, simply another manifestation of the competitive friction associated with increasing population pressures on resources of all kinds. Moreover, the spread of amateur interest in archaeology has been tremendous, but the number of jobs for professional prehistorians remains, as always, small.

Now, the growth of interest in prehistoric man within the population as a whole is in itself salutory, since it seems to reflect an intellectual curiosity which may temper in some measure the predominantly technological and commercial bent of our civilization. A large supporting public interest, furthermore, serves to sustain the professional archaeologist in his investigations. The degree of popular interest can be gauged to a certain extent by the acceptance of books dealing with the subject and by the avidity of news media for stories about excavation work.

But there is an inherent grave danger here, too, for this surge of interest and activity on the part of ever increasing numbers of people imposes a threat of early destruction of the limited, precious, and often unique sources of our data of prehistory.

It must be obvious to all that some serious reappraisal of this matter is needed without delay; that emotionalism must be subordinated to sober vision; that means of mutually supporting behavior between amateur and professional workers must be found, explored together, and agreed upon. In short, they must "plight their troth each to the other," in a union of minds and hands. This could well be a major aim of local and state archaeological societies, and of larger affiliations, including the Eastern States Archeological Federation and the Society for American Archaeology.

One hears frequent talk of enacting state antiquities laws to curb wasteful and pointless digging. Some states already have such legislation, as has the Federal government for its lands. I do not think, however, our only solution is to be found in legal sanctions. They are, in the first place, difficult to enforce. As a nation we boast of individual freedom and we still cherish a shadowy tradition of frontier independence. I subscribe to the concept of freedom in thought and action, even though the latter becomes more and more of an illusion with the tightening of centralized control correlated with steadily increasing demands upon finite natural resources which must be made available to all. But only the aberrant individual can feel free to violate his social obligations to the human community on which he is dependent.

We are, therefore, compelled to reconcile our outlook and to adjust ourselves emotionally to a pattern harmonious with the conservation of our natural and cultural resources.

There is much need for the amateur in the search for the means of obtaining a broader and deeper perspective of man's past achievements on which rest his potential growth in mental liberation from the superstitions of the past. This goal is, in fact, a central element of intellectual freedom and human dignity. The amateur can participate in this quest fruitfully and with immense self-satisfaction; his rewards here far transcend the possession of a collection of mute relics. When once he senses the *pursuit of problem* his mind will kindle to new and exciting adventures beyond the ordinary thrill of collecting. He can have his holiday with its relaxation, anticipation, and the thrill of discovery (which, incidentally, form a part of the reward of the professional digger as well), but he can add to these rewards the mental stimulus and satisfaction of contributing to the unfolding drama of human development.

The means to this larger end are to be found in an approach to archaeology which is *problem centered* rather than *relic centered*. The problems are many and diverse. They are best known to the professional who has given years of hard work, hard thought (and hard cash) in preparation for and execution of his job. He and the amateur can pool their efforts with mutual advantages. He can offer the amateur aid not alone in formulating problems for research, but in the procedure of recovery and recording that must be observed for useful interpretations, which constitute the intrinsic value of all such work. A collection of measurements is not enough to reach this end in digging a site, as too many amateurs have assumed. Nor is a collection of artifacts sufficient. Only painstaking attention to soil details, associations of features and objects, animal and plant remains (including charcoal for radiocarbon dating), postmold patterns, human skeletal remains, and numerous other items, will yield the harvest of information to be found variably on every site.

As a concrete instance of these assertions from personal experience, I periodically meet with various chapters of our state association to discuss archaeological problems and recount our field operations and, whenever possible, I spend a day or more at a time, by invita-

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EDITOR'S NOTE: One of the highlights of the 21st Annual Meeting of the Society, held in Lincoln, Nebraska, May 3-5, was the Workshop on Local Archaeological Societies, arranged by William J. Mayer-Oakes. Numerous speakers, discussants, and informal participants presented a great assortment of ideas and suggestions, many of which will be the basis for further work by committees of the Society and by local groups. It is impossible to publish here all the constructive and stimulating remarks made at the workshop sessions, but the following 2 papers are published to represent the whole. They both present points of view that were repeatedly echoed during the sessions, and which deserve even wider consideration than they have previously had.

tion, at the site excavations of an amateur worker to render specific aid and counsel. More than once this visit has meant the difference between fruitful and wasted data from his work.

All sites are of course not equally significant or difficult to investigate. On some, especially after a preliminary appraisal with professional guidance, the amateur can proceed by himself quite successfully. There are others — certain burial sites and stratified habitation sites, for example — where his competence, due to lack of training, is usually insufficient to prevent tragic loss of data.

If an amateur calls thus upon the services of his professional colleague for appraisal, advice, and actual assistance, need he thereby lose his site or his discoveries? This question, I find, is closest to the hearts of many of our nonprofessional friends. The answer is an unequivocal "no," as many can readily testify. Rights to the site and title to the collections can remain with the finder. As said before, the professional has better resources to appraise and interpret; he can often use, with proper credit, the information so obtained from the amateur in his published records, and he can encourage and guide his nonprofessional coworker to observe, record, interpret, and publish on his own. Herein lie the larger rewards for both.

At the annual meeting of the New York State Archaeological Association in Albany on April 14, 1956, where problems of mutual support were further explored, the amateur's need for specific instruction in field techniques was vigorously voiced by representatives of the group. It was proposed that *The Bulletin* of the state association carry articles on this subject by its professional members. While this seemed an excellent suggestion, I felt obliged to point out the insufficiency of written guidance alone to accomplish the desired ends. Direct experience is necessary and to supply this it has been our practice over the years to invite active members of our state archaeological society to participate as volunteer and, on occasion, paid members of the field party. That this "field school" method will return high dividends is proved in the case of some of our best nonprofessional archaeologists.

A closely related procedure is the group dig of an archaeological society or chapter under professional or semiprofessional supervision, requiring delegated responsibility for various operations and terminating in a published site report. This has certainly proved successful in various areas.

In the reciprocal relationship that we are considering, the nonprofessional archaeologist, singly or in his organized local group, can and sometimes does render a major service to the profession in salvage operations. Nearly everywhere in the country there is an immense acceleration of constructions of all kinds — roads and highways, dams, housing, and industrial expansions — in number and size far beyond the powers and resources of responsible institutions and individuals to cope with. The nonprofessional can perform with heroic capacity in this effort to save our rapidly eroding, limited potential of archaeological knowledge, by such measures as site surveys, test excavations, and even large scale digs. Credentials, permits, and advance information can usually be obtained for him by institutions in the area, whose staff archaeologists can then utilize their time to best advantage.

The inexorable hour has struck when separateness and selfishness must yield to collaboration in American archaeology, and the satisfactions of amateur and professional alike will be commensurate with the extent of their unity of purpose.

William A. Ritchie
New York State Museum
Albany, N.Y.
May, 1956

THE ROLE OF THE NONPROFESSIONAL IN THE LOCAL SOCIETY

The history of the natural sciences is replete with instances of valuable contributions by nonprofessionals, from the discovery of new stars, the recognition and description of new species of flora and fauna, the collection and accurate recording of specimens, to the interpretation of the sciences to the general public through the media of the written and spoken word. Many museums have been founded or enriched through the generosity of amateur enthusiasts. Unfortunately, on the other side of the coin there are too many instances of commercialism, hoaxes, and fakes in many sciences. Archaeology is a favorite field of the nonprofessionals, who are to be found in every city or town, running the full gamut of boyhood curio seeker, amateur collector, Boy Scout explorer, private museum owner, serious nonprofessional student, pot hunter, commercial collector and trader, manufacturer and purveyor of false artifacts, and manipulator of skillful hoaxes. The profesional and the honest nonprofessional, brought together in the local society, have the joint opportunity and responsibility of training the youth, restraining the overzealous, curbing the commercialist, and exposing the faker.

Everyone is agreed that the nonprofessional serves the science best who surveys his area; makes well-recorded surface collections; watches for accidental exposure of artifacts and sites which turn up as a result of highway, railroad, or other construction; helps to make local collections available for school instruction or the study of interested experts; and maintains contact with the nearest professionals. All of these valuable functions can be carried out more effectively through group action in a local society. Certainly the unwitting or careless destruction of mounds and sites, which is proceeding at a terrific pace since the advent of earth moving machinery, and the despoiling of sites by pot hunters or the wantonly curious can be prevented more effectively by group action than by individual effort.

The making of surveys and collections from sites which are threatened with destruction is an important function of amateurs in local groups. The best known

examples are the flooding of areas by dam projects, but in our area the caving in of river valley sites by the migrant streams, sheet and gulley erosion of hillside sites, and reverting of former farms to woodlands and pasturage are further examples of site destruction or removal from availability for surface collecting. In the South, the economic revolution of the past 20 years has resulted in the desertion of many marginal farmlands; in the more fertile areas there is a shift from cotton to cattle; many sites [illegible] which I made surface collections 20 years ago are vanished or covered with underbrush. The famous Gahagan burial mound and much of the site have caved into Red River, as have several other mound sites in its valley. The Belcher site is a cotton field, leveled by power machinery. The professional and intelligent nonprofessional would do well to study small local collections now, before they are broken up or the information about them dies with the collector, as many of the sites from which these collections came may no longer be available for study. In other parts of the country new sites will become available or old sites will disappear from other causes, as the face of the land changes, so that nonprofessionals in local societies can play important roles everywhere in collecting materials and recording information.

The serious nonprofessional can serve in other ways in organizations, which may be local, state-wide, or regional. Sometimes the enthusiasm of nonprofessionals sparks the formation of a society, often they stabilize it through continuity and perseverance — for the professional is more likely to move as his career carries him to other parts of the country or world — and always the nonprofessional can help with financial support, as he may be in a better position to contact the public.

I shall now indulge in the very human trait of illustrating my points by personal experience and observation, since all of us feel more comfortable in doing so, and enjoy it, whether or not our audiences do.

My first contact with an archaeological organization, in the 1930's, was in attending meetings of the Texas Archeological Society (then T.A. and P.S.). I found that this society had been sired, nursed along, and supported financially through the efforts of one enthusiastic amateur, Dr. Cyrus Ray — bless his crusty, kindly, argumentative soul! Now this society numbers several hundred members, professional and nonprofessional, is on a sound statewide footing, and has published valuable contributions to American archaeology.

In the latter 1930's my first contacts with professionals were with the L.S.U. group, Ford, Willey, Quimby, and Neitzel, and be it to their eternal credit that they welcomed a green amateur and tried to teach him something of archaeology and methodology. Soon thereafter, Jimmy Griffin even encouraged me to start typing the pottery from what was later to be the Belcher focus, the first attempt at Caddoan pottery typology.

During the early 1940's, W.P.A. excavations in the Caddoan area, in Texas and Oklahoma, some of which I was privileged to visit, led to talk of a Caddoan Area Conference. Preliminary meetings in my home, attended variously by Krieger and Newell from Texas, Beecher from L.S.U., Baerreis and Cobb from Oklahoma, laid the groundwork for the first Caddoan Area Conference, held at the University of Oklahoma in 1946. A subsequent pottery typology conference in my home was attended by Kreiger, Stevenson, Howard, Cotter, and Haag. Through the years since 1942, I have had the stimulating and pleasurable experience of corresponding, traveling, working, and arguing with Alex Krieger, in the attempt to clarify the picture of the Caddoan area. As an illustration of continuity, of all the professionals with whom I have worked on Caddoan problems, only Krieger and Bell are presently active in the area.

Many amateurs have rendered valuable service in the Caddoan area, keeping collections intact, making them and their records available to interested professionals or amateurs, and in some instances being active in organizations or making reports of their studies. Neild, Williamson, Todd, Fulton, Beckman, and Dodd in Louisiana; Lemley, Miroir, Dr. and Mrs. Hodges, Soday, Proctor, and Huddleston in Arkansas; Harris, Hayner, and others in Texas come to mind.

I am almost an imposter in this workshop on the local archaeological society, since I have not participated in the formation or conduct of such a society. However, in 1946, three of us originated the Shreveport Society for Nature Study which has included an active, although informal, group who were interested in archaeology. The other 2 founders were H. B. Wright, dioramist and curator of the Louisiana State Exhibit Museum, who is presently engaged in producing an immense diorama of Poverty Point, and W. C. Spooner, a geologist who had covered much of Guatemala, Honduras, and Yucatan on foot and muleback and had a keen interest in archaeology and ethnology. Although the Audubon Series constitutes a major part of the 6 to 8 annual meetings of this society, archaeological programs are included. At present Bob Fulton and several others continue studies of the Bellevue focus, Beckman and I are collaborating with Ford in bringing Poverty Point up to date and all of us are working with Neitzel at the Marksville State Museum and Haag at L.S.U. toward a state-wide summary and listing of archaeological sites. Formalized local and state societies are in the offing.

Proper encouragement of youth is one of the functions of the nonprofessional. During the past year Fulton has guided a Scout Explorer Troop from haphazard collecting to organized study of sites. I have had the happy experience of working with 2 high school students, in east-central Louisiana and east Texas, who have a near-professional approach in perception and methodology. Both will likely enter the professional field.

If the first person singular has been used here too often, forgive me, but it best presents my conception of the ways in which the nonprofessional can participate with the professional toward local and regional goals. From personal experience I can assure the amateur who is interested and willing to learn that he will have the encouragement and assistance of the professional in his

area; conversely, the professional can be certain of a wealth of enthusiasm, many man-hours of time and legmiles of distance if he cultivates the amateur.

To the professional and nonprofessional I would say that there is work for all to do, individually and collectively, but we can do it much better if we are banded together on the local, state, regional, or national level. On behalf of the thousands of amateurs in the country, my thanks to the enlightened professionals who have not scorned us, but have helped to make our avocation a search for truth as well as an enduring pleasure.

CLARENCE H. WEBB
Shreveport, La.
May, 1956

A LITHIC INDUSTRY OF PALEO-INDIAN TYPE IN VENEZUELA

In the latter part of January, 1956, the Universidad Central de Venezuela commissioned me to explore the region of Pedregal in the State of Falcón, northwestern Venezuela (Fig. 1). For some years, I had been thinking that it should be possible to encounter traces of the paleo-Indian in this part of Venezuela. I based this inference especially on drawings of fragmentary chipped stone artifacts from there published by Nomland (1935: 100, Fig. 20 *h-l*).

Elsewhere, the only known evidence which might be typologically attributed to the paleo-Indian was a chipped stone point from Hacienda Capá, District of Bejuma, State of Carabobo, which was donated to the Museo de Ciencias Naturales in Caracas in 1940 by Luis Rodolfo Pinto (Cruxent and Requena 1945; Dupouy 1945). Various arrowheads with trimmed edges are also known (Oramas 1946; Cruxent 1954) but cannot be identified as paleo-Indian for lack of better data and because some of them have been found in association with pottery (at the Raudales de Atures on the Orinoco River; Cruxent 1954.)

Returning to the Falcón specimens, we now have no doubt that this lithic material, which Nomland (1935) specifically attributed to the site of La Maravilla, was accidentally mixed by the collectors with the artifacts from La Maravilla and actually came from another site. This accident may be explained by the circumstance that the collectors were 2 geologists, L. W. Henry and J. O. Nomland, who transmitted the material for study to Gladys Ayer Nomland, archaeologist. We have come to possess a very thorough knowledge of the site of La Maravilla and have not encountered there any "shaped implements made of sandstone" coexisting with potsherds, as reported by Nomland (1935: 70). This circumstance leads us to think that very possibly Nomland's lithic material is intrusive into the La Maravilla collection and actually comes from the region of Pedregal, to the south of La Maravilla.

We undertook to explore the region of Pedregal upon receiving in Caracas a collection of potsherds with which were mixed some fragments of chipped stonework. Although we confirmed by correspondence (Acosta to Cruxent) that the stone artifacts had been found with the pottery, we organized an expedition to undertake a general survey of the area. The Prefect A. Acosta, Dr. R. Zirit, Sr. F. F. Ferrer, Professor Rojas, Director of the Liceo Cecilio Acosta of Coro, and other interested persons composed the party. The government of the State of Falcón put at our disposal a jeep, which was indispensible for travel in that area where the rivers are difficult to cross and the roads consist merely of trackre often obstructed by rocks.

We proceeded to the village of El Jobo, consisting of some scattered huts with a population of about 60, on the road from Coro to Sabaneta, Pedregal, and Avaría (Fig. 1). This village is some 20 km. beyond the town of Pedregal and belongs politically to the municipality of Pedregal, District of Democracia, State of Falcón. It is situated on heavily eroded, clayey soil in a slightly undulating terrain. The vegetation is entirely xerophytic and grows sparsely on the hard, bleached, humus-free soil.

The first site we visited at El Jobo was a place called La Casa Vieja (CX344, El Jobo 1). Here we collected from the surface of the soil some fragments of quartzite showing evidence of chipping, as well as modern pottery, porcelain, glass, and iron fragments, apparently laid down by the inhabitants of a thatched hut which is said to have been situated there during the middle of the last century. This coexistence of lithic material of seemingly paleo-Indian type with modern refuse was probably the consequence of erosion, which has destroyed the stratigraphy of the site.

Other sites were discovered near La Casa Vieja which contained only lithic material, unaccompanied by intrusive modern refuse. These sites also consisted of material eroded from the surface of the ground and were relatively rich in stonework. The complete list of sites is as follows:

CX344	La Casa Vieja	El Jobo 1
CX345	Quebrada de Taque	El Jobo 2
CX343	La Piedra de Chispa	El Jobo 3
CX349	La Piedra de Chispa (parte alta)	El Jobo 4
CX348	Corralito	El Jobo 5
CX347	El Conejal	El Jobo 6
CX378	El Barrancón	El Jobo 7

The cultural complex of lithic implements which we collected at these sites seems to pertain to the paleo-Indian type because only projectile points, knives, scrapers, gravers, and coarse hammerstones have been found. The projectile points and knives are lanceolate or leaf-shaped. All appear to have been made by percussion chipping with fine trimming along the edges. The material used is a sandy quartzite (Figs. 2, 3).

During the course of our survey, we came to believe that we had encountered the remains of a workshop, because of the great quantity of chips which we collected. So far, we have found no bones or shells of any kind.

The lithic material is as yet unstudied, and we present these notes only to put the find on record. We have made no comparative studies, nor do we have any hy-

pothesis concerning the origin of the El Jobo culture, for it would be precipitious to advance theories which might subsequently complicate our studies more than they would orientate them.

Since the above was written, the Universidad Central has organized an expedition which spent most of the month of March in making a more intensive study of the El Jobo sites. J. M. Cruxent, the leader of the expedition, was accompanied by a geologist, G. D. Johnson, of the Creole Corporation. No stratigraphic or paleontological evidence of antiquity was obtained, but charcoal was collected from several small hearths and is undergoing radiocarbon analysis at the Yale Geochronometric Laboratory. Some 3000 quartzite artifacts are now on hand, showing somewhat greater variety than the original finds.

For the moment, we have only attempted to present a notice of the original finds and to illustrate them as well as possible so that they may be known to our colleagues who are interested and who have specialized in paleo-Indian material. We have no doubt that these archaeologists will give us their valuable opinions concerning our studies, a collaboration for which we will be most grateful.

J. M. CRUXENT
Universidad Central and Museo de Ciencias Naturales
Caracas, Venezuela
February, 1956

Professor Cruxent sent the above note to the undersigned for translation from Spanish. He also furnished us with notes, photographs, drawings, and a sample collection of specimens, from which we have prepared the

FIG. 1. Map of northwestern Venezuela, showing location of the El Jobo sites.

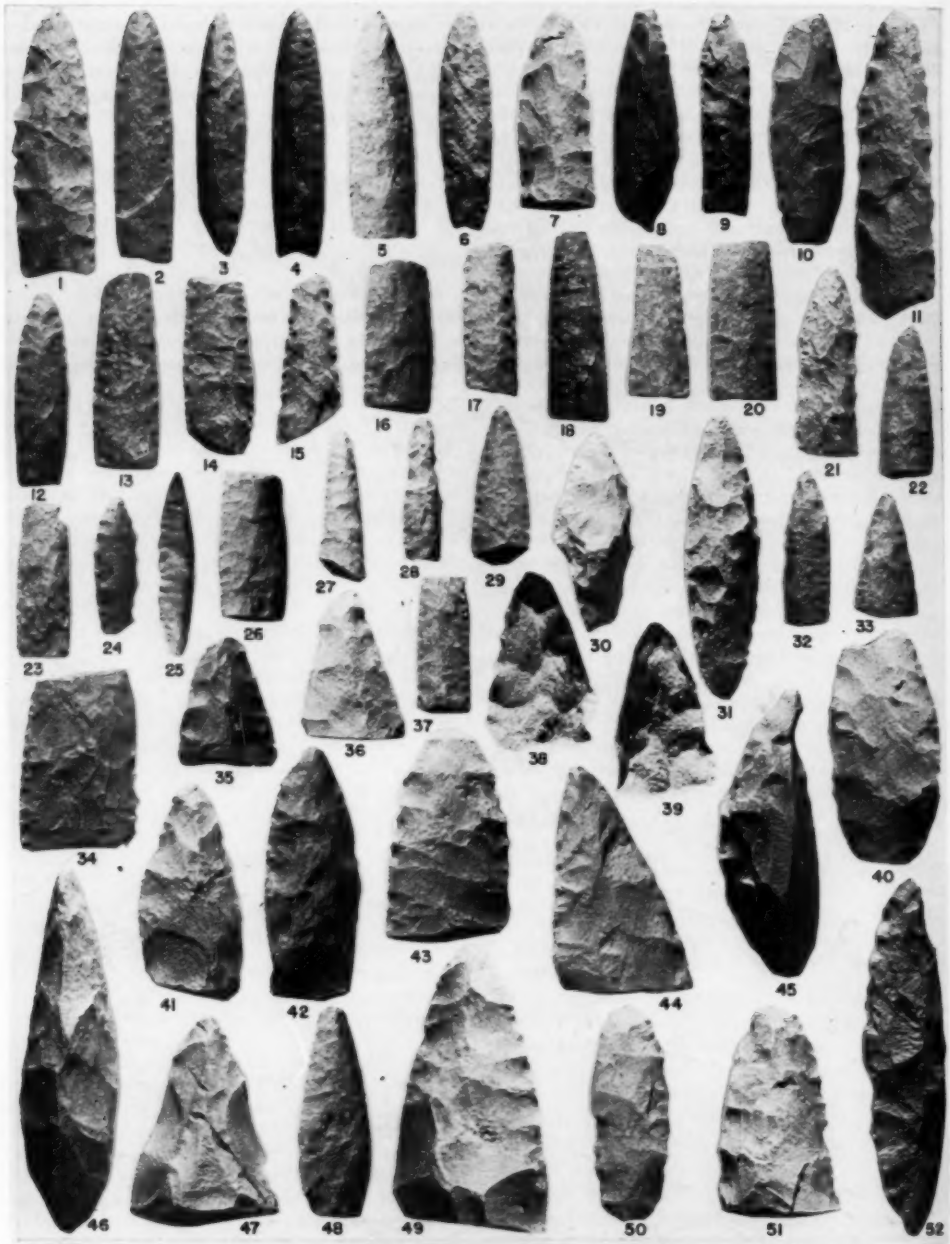

FIG. 2. Projectile points and other quartzite artifacts from the El Jobo sites, northwestern Venezuela. All are bifacially chipped except 46, which is unifacially chipped. Scale ½.

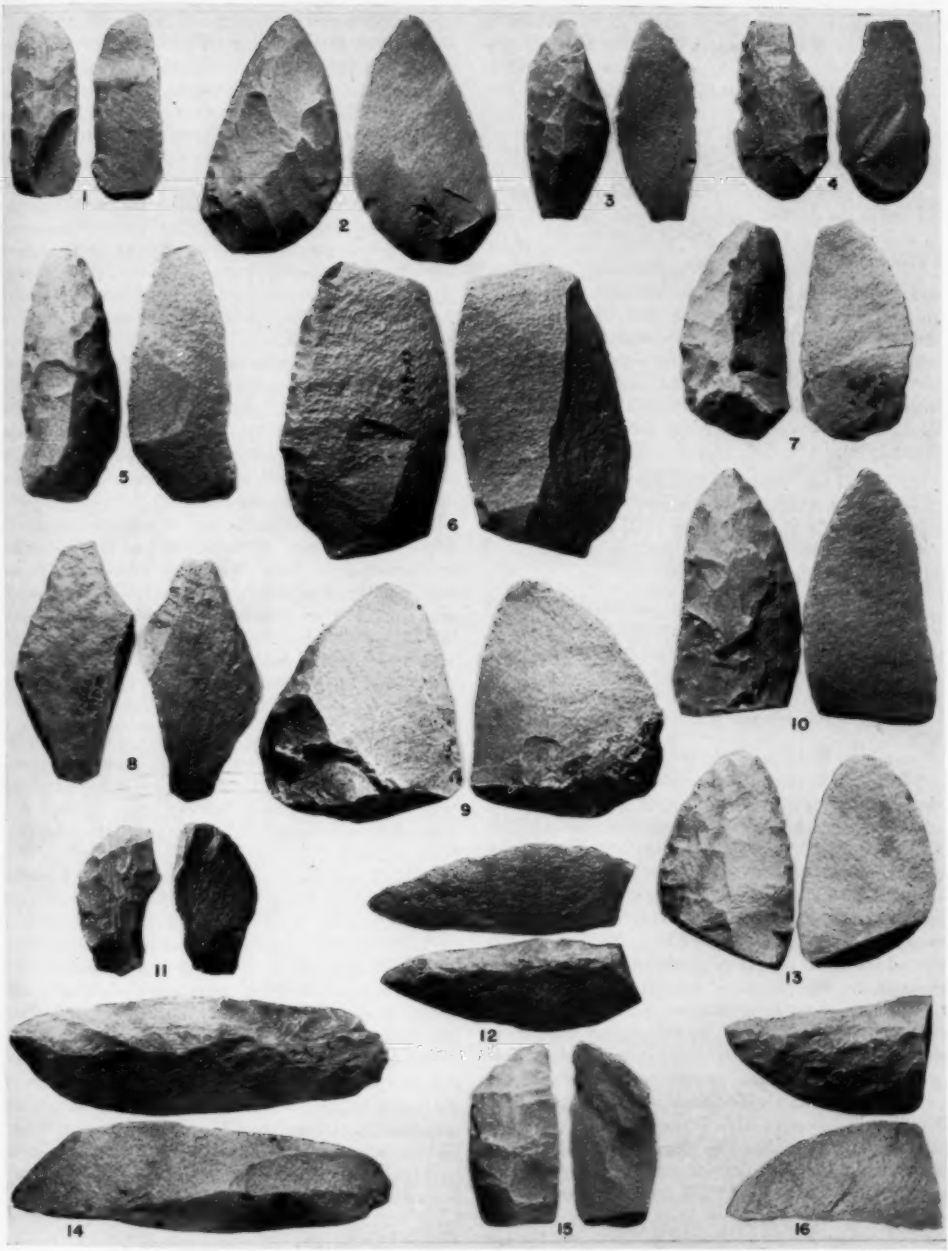

FIG. 3. Unifacially chipped quartzite scrapers from the El Jobo sites, northwestern Venezuela. Scale ½.

accompanying illustrations. Since he calls for opinions concerning the find, we have submitted his material to a number of North American specialists for their comments, which are given below. (We are indebted to Marie Wormington for arranging for most of these comments.)

IRVING ROUSE: It seems appropriate to begin by comparing the El Jobo material with previous finds in the Caribbean area, that is, in the north coast of South America and in the Antilles. The El Jobo collection, as I know it, differs from the usual chipped stone artifacts of the Caribbean area in 3 major respects:

1. Most of the El Jobo flake artifacts appear to be chipped more or less completely over both surfaces, if they are bifacial (Fig. 2), or over one surface, if they are unifacial (Fig. 3). By contrast, the surfaces of the usual Caribbean flake artifacts are plain, except for the scars where previous flakes have been struck off and for occassional trimming along the edges (Lovén 1935: 210-23; Rouse 1942).

2. The El Jobo collection includes projectile points of chipped stone, whereas the ordinary Caribbean projectile points are made of bone (Rouse 1951, Fig. 1 *d*), or, as among some modern Guianan Indians, of hard wood which does not survive in the sites.

3. The El Jobo projectile points are lanceolate or leaf-shaped and lack stems. (This statement refers to the original collection; Cruxent informs me that he found several stemmed points during his second trip to the site.) By contrast, the ordinary Caribbean points, whether of bone or wood, are biconical or stemmed (Roth 1924: 160).

There are 2 principal exceptions to the foregoing characterization of Caribbean chipped stonework, both of which have some but not all of the El Jobo characteristics. Various sites on Hispaniola, particularly those of the nonceramic Couri culture in northern Haiti, have yielded large, lamellar flakes, many of them with pronounced tangs. We have perhaps injudiciously referred to these tanged flakes as "daggers" (Rouse 1941: 25-9). Coe (1957) instead identifies them as projectile points and compares them to the flake points of Central and Mesoamerica. In any case, these specimens are unifacially rechipped only on the tang; elsewhere, the surfaces are left plain in the usual Caribbean fashion.

The second exception consists of a series of "dart points" from Old Harbor, Jamaica, which have been described by Lovén (1932). These specimens are bifacially rechipped but differ in shape from the El Jobo points: they have triangular blades and most are provided with barbs and/or stems. While Lovén (1935: 223) has compared them to Maya projectile points, they appear to me to be more similar to Archaic points in the Eastern United States. (They are somewhat less like several bifacially chipped, stemmed points which have been collected as isolated finds in Venezuela and the Guianas; for example Roth 1924, Pl. 36 *A*; 1929, Pl. 1 *A*.)

So far as I am aware, the only finds in the Caribbean area which correspond to the El Jobo collection in all three of the characteristics listed above are two of those referred to by Cruxent: Nomland's La Maravilla stonework and the point from Hacienda Capá, Bejuma, Carabobo. The former is too fragmentary for evaluation, but the Hacienda Capá point is complete and appears to me, from the drawing published by Dupouy (1945: 82), to be very similar to the El Jobo points.

Wormington (1953: 65) has made the following comment concerning the Hacienda Capá point: "This specimen is a long slender, lanceolate point which tapers to a narrow base. A drawing suggests that the flaking is parallel. Similar points were found in a site in the Angostura Reservoir area of South Dakota which yielded a Carbon 14 date in the 7000s."

The sample collection sent to me by Cruxent includes points with all the traits mentioned by Wormington, although it should be noted that the parallel flaking is poorly defined and is concentrated on the edges of the specimens, extending only part way towards the center. It is reasonable, therefore, also to compare the El Jobo specimens with Angostura points.

In support of Cruxent's claim of antiquity for the El Jobo collection, then, we may note that (1) it is unlike any other appreciable collection of chipped stone artifacts from the Caribbean area and (2) it resembles the projectile point from Hacienda Capá which Wormington has compared to the Angostura type. It remains to be seen whether stratigraphical, paleontological, or radiocarbon data can be obtained in support of these comparisons.

H. M. WORMINGTON: I find it more difficult to comment than I had anticipated. When I first saw colored slides of the specimens from El Jobo I had a superficial impression of similarities between these artifacts and some of those recovered at the Long site in the Angostura Basin in South Dakota. However, now that I have seen clear black and white photographs and examined some of the actual specimens I feel that the 2 assemblages are not really similar. In an earlier publication (Wormington 1953: 65; cited above), I noted that the Hacienda Capá point resembled some of the Angostura points from South Dakota. Since I had never seen this specimen and my judgment was based entirely on a drawing, it is quite possible that I was mistaken.

So many of the Venezuelan points are fragmentary that it is difficult to determine their shape. The form of the complete specimens, however, suggests that, while some may have been lanceolate, others were pointed at both ends. All Angostura specimens that I have seen have straight or slightly concave bases. I believe that there are also notable differences in flaking techniques. It is my impression that the Angostura specimens are characterized by the removal of long, narrow flakes, essentially parallel to each other, and often directed obliquely across the face of the blade. Most of the El Jobo specimens, on the other hand, exhibit broader, more irregularly placed flakes over the main surface and an extremely fine margi-

nal retouch. I do not believe that the latter is conspicuous on the South Dakota specimens. The nature of the material used could, of course, be a conditioning factor, and the Venezuelan points are made of quartzite, which is not easily flaked. I do not feel, however, that this is sufficient to account for the differences.

Far closer similarities can be found if the El Jobo specimens are compared with the artifacts found with the second mammoth uncovered near Santa Isabel Iztapan in the Valley of Mexico (Aveleyra 1955, 1956). Specimen 1 exhibits an essentially straight base, which, as far as I can judge, is not present on any of the El Jobo specimens, but it does show the same type of broad overall flaking combined with an extremely fine marginal retouch. Specimen 2 is a laurel leaf form which very closely resembles some of the El Jobo specimens and there are striking similarities as regards flaking technique. This point is characterized by the removal of broad, irregularly placed flakes and, as in the case of the Venezuelan specimens, there is a delicate pressure retouch along the edges that produces an edge which looks slightly serrated. The Mexican specimen exhibits basal grinding. It would be interesting to know if any of the Venezuelan specimens do. It is difficult to judge on the fragments I have examined and could be more easily checked on the complete specimens. The third artifact from the Mexican site is the fragment of a large bifacial implement (Specimen 3) that closely resembles some of the El Jobo pieces. Aveleyra classified Specimen 1 as an Angostura point. I would not put it, nor the El Jobo specimens, in this category. The similarities between the Santa Isabel Iztapan artifacts and some of the El Jobo specimens, however, seem quite striking.

Further information regarding the distribution and age of the doubly pointed forms, sometimes called laurel leaves, is urgently needed. They occur as far north as Canada. A considerable number have been found in Alberta under circumstances that lead me to suspect that they are an early form there. Definite proof of age is lacking, however. One such point was found in the Folsom layer at Sandia Cave (Hibben 1941, Pl. 6 *g*). The presence of one of these specimens in association with mammoth remains in the Valley of Mexico indicates that the type was in use still farther south at an early date. The large bifacial implements and the plano-convex scrapers in the El Jobo collection have less diagnostic value, but they would not be out of place in a number of paleo-Indian assemblages. Similar tools were found at the Lindenmeier site (Roberts 1935), Sandia Cave (Hibben 1941) and at Blackwater No. 1 Locality, New Mexico (Sellards 1952).

E. Mott Davis: Marie Wormington sent the El Jobo material on to me, and I have gone over it with others at Lincoln, including Richard P. Wheeler (who did most of the work at the Ray Long site, the type locality for Angostura points), Franklin Fenenga, and Robert L. Stephenson. The remarks which follow, although written by me, are inspired by this joint inspection.

The better-made points and the thick unifacial scraper planes seem to be the significant items in the El Jobo collection. The rest of the specimens do not seem distinctive.

First, concerning the points. In outline and flaking, they resemble certain point forms, all early, from the Plains area. In particular we are struck by resemblances with Agate Basin points (Roberts 1951: 19; Wheeler 1954) — which are, however, appreciably thinner than the El Jobo specimens — and with Nebo Hill points (Shippee 1948). The El Jobo points are not like Angostura points, as the latter are thin and have oblique, parallel ripple-flaking and concave bases.

Turning to the scraper planes, we note that similar items occur in North America, and that the context seems generally to be early. They are early in southern California (for example, in the Topanga complex; Treganza and Malamud 1950, Pl. 19), have a very wide time range in the Basin and Plateau province (Hunt 1953: 120), and have been found associated with Plainview points at the Red Smoke site in Nebraska, dug by myself but not yet published.

In general, then, the distinctive items in the El Jobo collection have parallels in western North America, and the North American cases are for the most part early — that is, pre-Altithermal. Despite the wide geographical gap between the Great Plains and Venezuela, it would seem justifiable to suggest the hypothesis that the resemblances cited indicate common traditions. If more instances are found in the intervening area, the case will be strengthened. In this connection, Wormington's comments about the specimens from Santa Isabel Iztapan are particularly significant.

Alex D. Krieger: The opinions given below are derived from an examination of 5 fragmentary projectile points, 3 bifacially chipped "knives," and 3 plano-convex "scrapers"; black-and-white photographs and kodachrome transparencies of several dozen other specimens; and catalog cards which give the cross-sectional dimensions of these specimens. These opinions are subject to the limitations of this material and may be altered when a fuller examination can be made. The principal impressions of the writer are as follows:

1. A considerable range of workmanship is apparent, from very crude percussion to fairly fine pressure work, particularly on projectile points. While "fairly fine" may be an unjustified description, it appears to me that this quartzitic material could hardly have been chipped with any greater refinement than appears on the *best* specimens.

2. The artifacts which are probably projectile points are too narrow and too thick to be compared favorably with such types as Angostura or Plainview. On the other hand, they do bear definite similarities to 2 types of about the same early Postglacial age in the United States and Mexico, namely, the "Nebo Hill" and Lerma types. I enclose "Nebo Hill" in quotation marks because this type has not yet been formally described and may only be approximated by viewing the Nebo Hill collection de-

scribed by Shippee (1948). Disregarding some of the specimens illustrated by Shippee, the following may be regarded as "Nebo Hill" points: Plate II, row A, *c, d, g*; row B, *b, e*; row C, *c, d, e, f*; row D, *e*. The same collection shows other types which may possibly be identified as follows: Angostura (?), row A, *e, h*; row B, *a, c, f*; row C, *h*. Lerma (?), row A, *f*; row B, *d*; row D, *d, f*. Plainview (?), row C, *i*.

3. Among the El Jobo artifacts which appear to be projectile points, the photographs show that all have a long, narrow lanceolate shape, but that some have straight to slightly convex bases while others are bipointed. These 2 groups agree in a general way with "Nebo Hill" and Lerma points, respectively, in their long and narrow lanceolate form as well as in their unusually thick cross-sections, even when made of flints which could have been thinned down much more. I do not know whether any El Jobo projectile points have smoothed basal edges; if not, they differ in this respect from the majority of specimens in the various types of "paleo-Indian" age in the United States, Canada, and Mexico.

4. The distribution of "Nebo Hill" points has not been worked out at all, but a few occur in central Texas in the Edwards Plateau aspect. No one yet knows when this "Archaic" culture of central Texas began; various "paleo-Indian" types occur in it in small numbers, either as survivals or picked up by later peoples (Suhm, Krieger, and Jelks 1954: 99-106). Lerma points are found widely in Texas, extending into southern Tamaulipas, where MacNeish (who first recognized and named the type) has found them in his earliest preceramic levels (Suhm, Krieger, and Jelks 1954: 440, Pl. 99); they extend eastward as far as Alabama, where Mahan has found them apparently associated with Clovis fluted points; and Wormington reports them (described as "doubly pointed" in her comments above) from as far north as Alberta, also apparently in an early context. Aveleyra identifies one of the 2 projectile points with the second mammoth of Santa Isabel Iztapan, in the Valley of Mexico, as a Lerma point, following the opinion of the writer (Aveleyra 1956: 24, Fig. 7, *2*). This type frequently has smoothed basal edges, as does the Iztapan specimen. (Projectile point No. 1 with this mammoth has been related to the Angostura type, and the sole projectile point with the first Iztapan mammoth has been similarly related to the Scottsbluff type.)

5. The El Jobo industry appears to bear a fairly definite connection with the earliest known American complexes which include chipped-stone projectile points because (a) the material available to the writer seems to consist primarily of lanceolate (leaf-shaped) points, plano-convex scrapers, bifacially chipped "knives," and evidently, some fine gravers; and (b) nothing has been reported with it such as barbed or notched points, heavy chipped "axes" or gouges, "drills," or grinding tools. On the other hand, the collection includes some peculiar plano-convex scrapers which are well-shaped over the upper side, have a high, steep ridge on this side, and come to a sharp point at one or both ends. Scrapers similar to these are well known in the Edwards Plateau aspect of central Texas, where they are not regarded as "paleo-Indian" but as "Archaic" or "Proto-Archaic." The El Jobo collection also includes some crudely-chipped thick biface artifacts which come to a rude point at one end; these also are common in the Edwards Plateau aspect where we call them "picks" for want of a better name. The occasional presence of "Nebo Hill" points in Edwards Plateau has already been mentioned.

6. The El Jobo industry therefore appears to be related to the oldest North American period which includes projectile points (Sandia, Clovis, and Folsom) in the simplicity of its artifact inventory, but the El Jobo projectile points themselves agree best with a somewhat later period, when fluted points had largely if not entirely disappeared from North America. This period is characterized by a number of lanceolate projectile-point types such as "Nebo Hill," Lerma, Angostura, Plainview, Meserve, and others which have incut stems and squared shoulders, such as Scottsbluff. In the United States, at least, this period is also characterized by additional artifacts such as "axes," "gouges," "drills," and grinding tools which, so far as I know, have not been found in the El Jobo sites. As pointed out by Wormington, the artifacts with the mammoths of Santa Isabel Iztapan in central Mexico seem to provide a slim connecting link between this highly interesting assemblage from Venezuela and the Great Plains of the United States.

It would be well to forego further conclusions at present; we are dealing with vast geographical areas and exceedingly scanty evidence from intermediate areas. We are in no position as yet to state what early types are present or absent in Mexico and Central America. My comments, then, consist of things that might be worthwhile to think about, not really conclusions.

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IRVING ROUSE (compiler)
Yale University
New Haven, Conn.
May, 1956

FIRE HARDENING OF WOOD

The literature of anthropology contains so many references to the fire hardening of arrow and spear points, digging sticks, and other pointed implements of wood that the assumption has become dogmatic and almost fixed. It is needless to refer in particular to specific writings which contain references to fire hardening.

Since fire hardening is assumed to be a culture trait of importance, I decided to make a series of experiments to determine to what extent wood was altered by being charred in a fire. I could find no instance of commercial use of the process and therefore assumed that since the process was unused commercially it must lack value. My intention was to construct apparatus similar to the Brinnel test for hardness of metals, namely by pressure of a steel ball. The crater thus formed is measured for diameter and gives a quite accurate basis for comparison. Since construction of this apparatus might involve weeks of time, I felt that inquiry might disclose the fact that such tests had already been made. A letter to the Forest Products Laboratory at Madison, Wisconsin, was answered at once and contained an enclosure showing a method similar to the one I had in mind: "Standard Methods of Testing Small Clear Specimens of Timber." American Society for Testing Materials, 1016 Race Street, Philadelphia, Pennsylvania. (ASTM Designation 4 143-52, p. 19.)

Since I had explained the problem in my letter, the answer from T. R. Truax, Department of Wood Preservation, contained the following paragraph:

> When wood is heat-treated at elevated temperatures, its hardness is often increased, but the increase is not enough to make soft woods equivalent to hardwoods or a hardwood such as ash, equivalent to hickory. Furthermore, other properties of the wood, particularly toughness and resistance to abrasion, are deteriorated by the heat. For these reasons, no commercial use has been made of fire hardening so far as we know.

After receiving this information, I made "primitive" tests of my own. Two samples of the same piece of wood, each an inch in diameter, were used. Mesquite, ash, and ponderosa pine furnished enough hardness range. One piece of each species was charred to a point while the other was reduced by paring and sanding. Each point was then repeatedly thrust into gravelly soil until it began to show signs of wear and abrasion. The thrusts

were counted. There was no discernible difference. Admittedly, such a test is far from scientific, but no more so than is the assumption of fire hardening.

It appears that wooden rods were burned in the fire simply because this is the easiest method of making a round, smooth point on a piece of wood. The labor of cutting such points with stone knives and scrapers would certainly justify the process. The term *fire pointing* seems obvious, and is preferable to *fire hardening*.

Aaron J. Cosner
Tonto National Monument
Roosevelt, Arizona
February 8, 1955

WINTER ARCHAEOLOGY: TO FREEZE OR NOT TO FREEZE

Once in a while in American archaeology, funds limited by an expiration date or a pressing need for information before site destruction demand carrying on field operations during winter months. When either or both emergencies occur — both did in the 1954-55 winter at historic Jamestown, in Colonial National Historical Park — certain questions arise as to what type of excavating may be efficiently carried on under adverse weather conditions. Possibly the answers gained from experience here may be of interest and value outside of the National Park Service.

Faced with the need to accomplish over 30 separate excavation and exploration projects by 1957, the 350th anniversary of the founding of Jamestown, 4 archaeologists were assigned to projects sponsored by the State of Virginia Jamestown Celebration Commission, the Federal Jamestown-Williamsburg Yorktown Celebration Commission and the National Park Service. The National Park Service assumed responsibility for all operations, with Louis R. Caywood at Greenspring, the original plantation of Governor Berkeley, Joel Shiner in quest of the first fort built at Jamestown, and Edward Jelks and the writer in an unexplored section of James Citty, on Jamestown Island. All of this work was pursued through the fall into the dead of winter — a winter not unlike the one which so dismayed the settlers of 1607-08.

In all, 3 blizzards brought a total of at least 14 inches of snow. With a loss of only 2 days, work progressed steadily at Jamestown. Between November, 1954, and March, 1955, a mile and a half of exploratory trenches had been completed, and 20 major features had been located at Jamestown and Greenspring. Tarpaulins on frames kept the crews relatively dry. The cold kept them working.

Totaled up, assets and liabilities of winter archaeology in a temperate climate (if anyone thinks Virginia has an open winter, let him experience one and be undeceived) appear to us as follows:

Assets: 1. Ground features, such as post molds, property line ditches, pits, or any other disturbances in the soil will usually show up to good advantage under moist conditions.

2. The absence of such distractions as ticks, mosquitoes, flies, and other fair weather pests makes for healthier working conditions, on the average.

3. Labor is relatively plentiful, especially in agricultural districts.

Liabilities: 1. Extremely cold and adverse weather may cause work stoppage and slowing of operations to clear snow, care for tarpaulins, and so on.

2. Exposed masonry or brick walls not allowed to dry out and remain dry will, if attacked by frost, disintegrate at an alarming rate.

3. Moist soil is more difficult to find artifacts in, and de[illegible]es sifting.

4. Photography is more difficult. Cameras are amazingly temperamental in cold weather, and timing of shutters tends to be faulty.

Conclusions. Winter archaeology is suitable for exploratory trenching, locating but not uncovering structural features, and uncovering difficult-to-spot soil changes. Masonry structures may be located, but should be left buried until after danger of frost.

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March, 1955

A PETROGRAPHIC STUDY OF GILA POLYCHROME

Gila Polychrome pottery has been recognized since the time of the earliest archaeological work in the Southwest. Cushing, in 1887-88, recognized in the polychromes at Los Muertos and other Classic period sites of the Hohokam area the pottery type we now call Gila Polychrome. As more of the Southwest became known this type (W. and H. S. Gladwin 1930: 6) was found to be one of the most widespread, with a range extending from the Mogollon Rim on the north into northern Chihuahua and Sonora on the south and sporadically from Texas on the east through New Mexico to Gila Bend, Arizona, on the west (Haury 1945: 63).

Concentrations of Gila Polychrome are found in the Roosevelt and Tonto basins, the Point of Pines area of eastern Arizona, the Gila Valley around Safford and to the west, and the San Pedro and Santa Cruz valleys. It is thought to have been made by the members of the Salado culture (W. and H. S. Gladwin 1930: 3; Haury 1945: 63) during the 14th century in the northern portion of its range and possibly to have been made even later in the southern section (Di Peso 1953: 262). Gila

TABLE 1.

A PETROGRAPHIC ANALYSIS OF GILA POLYCHROME

MATERIAL \ AREA / SAMPLE	POINT OF PINES					MIMBRES					CASA GRANDE					UNIVERSITY RUIN					GILA PUEBLO				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
ALUNITE																					25	20	20	25	25
APATITE															1										
AUGITE GRAINS									2.5	1															
BASALT	13	10	5	20	13	5			2.5												10	10	5	5	5
BIOTITE	3	T	3	3	T						3	5	T	2					T						
BRUNITE																							2		T
CALCITE						1.5					22	25	30	25	30								T		
CALCITE (SECONDARY)								1.5		1								4							
CHALCEDONY							1			5															
CORUNDUM								2.5	2																
DARK BROWN APHANITIC CLAY-LIKE MATERIAL						50	47	48	53	50															
DARK BROWN FERRUGINOUS CLAY-LIKE MATERIAL																50	50	50	45	50					
DARK BROWN CLAY-LIKE BONDING MATERIAL (UNIDENTIFIABLE)																					40	40	40	40	50
DEVITRIFIED GLASS (OBSIDIAN)	5	7	5	10	15																10	15	10	10	7
EPIDOTE											2														
FELDSPAR (MICROCLINE / ORTHOCLASE)												5	5												
GARNET	T				T																				
GLASS SHARDS																					10	10	10	10	5
GNEISS							15	10	5	15						25	20	15	20	25					
HEMATITE								1	1																
HEULANDITE																									3
HEULANDITE / STILBITE																					2	T	3	5	
HORNBLENDE								1		1.5															
HYPERSTHENE GRAINS						5		2.5	2.5																
HYPERSTHENE IN QUARTZ							1			1															
LEUCITE	8	10	17	7	8																				
MEDIUM BROWN APHANITIC GROUNDMASS	47	50	50	46	50																				
MELILITE	13	15	13	7	8																				
MICROCLINE							1			2.5				5	5		2.5	2.5	5	2.5					
NATROLITE / THOMPSONITE																					3		5		
OBSIDIAN	3	3			2																				
ORTHOCLASE																2.5		2.5		1					
ORTHOCLASE FELDSPAR														1											
ORTHOCLASE (GHOST)								1		1	5														
PLAGIOCLASE FELDSPAR (ANDESINE)						1											2.5								
PLAGIOCLASE FELDSPAR (OLIGOCLASE)																				1.5					1
PLAGIOCLASE FELDSPAR (OLIGOCLASE / ANDESINE)											5	5	10	2	5	2.5		3.5	2.5						
PLAGIOCLASE FELDSPAR (BADLY WEATHERED OLIGOCLASE / ANDESINE)								1																	
PORPHYRITIC AUGITE BASALT						2.5	7.5	5																	
QUARTZ			7	7	4		20	25	2.5	20	60	45	40	50	45					5					
QUARTZ FROM GNEISS						15													7.5						
QUARTZ GRAINS, STRAINED						20											10								
QUARTZ (INCLUDING CHERT)	8	5																							
QUARTZ (SECONDARY AND VEIN, COMBINED)																7.5									
QUARTZ (STRAINED AND VEIN, COMBINED)																		7.5							
SCHIST																12.5	15	15	20	15					
SCHISTOSE GRAINS											3														
SCHISTOSE QUARTZ GRAINS												15	15	15	10										
SILLIMANITE (SMALLER STRUCTURE)							7.5		2.0																
STILBITE																									2
UNIDENTIFIED ZEOLITE																						5		5	3
ZIRCON											1														
T = TRACE																									

Polychrome has been well described in the literature (W. and H. S. Gladwin 1930: 67; Haury 1945: 64-80). Haury in his description remarks that:

> Pottery with as wide a distribution as Gila Polychrome was probably not exactly the same wherever it occurred unless all of it was produced in one limited area from which it spread via trade channels. This is one of the first things which needs to be settled. . . . Whether Gila Polychrome was actually made at Los Muertos or in any ruins of the Gila-Salt is still a debatable point.

Schroeder (1952: 330) says that:

> The variability of occurrence and association of Gila Polychrome, not only in the Gila Basin but in other areas as well, might also be considered, along with the lack of an associated related utility type, in establishing this pottery as an intrusive rather than a local article of manufacture [in the Gila Salt Basin].

He feels that although Gila Polychrome appears in his tests (1952: 324) and in those of Gladwin at Casa Grande (Gladwin 1928: 11-17) it makes up so small a percentage of the total sherds that it does not imply a Salado influx into the Gila-Salt Basin.

Gila Polychrome has been found at Point of Pines in east central Arizona (Wendorf 1950: 35; Smiley 1952: 62). The proximity of Point of Pines to the Globe-Tonto Basin area, considered to be the center of the Salado cultural development, would make trade an easy affair and Smiley (1952: 62) considers Gila Polychrome a trade ware in that region.

However, on examining the paste of sherds of Gila Polychrome found at Point of Pines, white flecks could be seen which were similar to the white flecks in the paste of the local utility wares. This similarity, plus the results of a trial petrographic analysis of the pottery types, including Gila Polychrome, found at the University Indian Ruin at Tucson (report by Julian Hayden and E. B. Danson, in preparation) led to the present study.

Petrographic studies were made by Roberts M. Wallace (at the time a graduate student in the Geology Department at the University of Arizona, minoring in anthropology) of 5 sherds taken from collections in the Arizona State Museum, from the University Indian Ruin at Tucson, Gila Pueblo at Globe, Point of Pines (Arizona W:10:50), and the Mimbres area. Also 5 sherds from Casa Grande National Monument were studied.

These were analyzed in the following manner. The sherds were cut and ground down into thin sections approximately 0.03 mm. thick and mounted on glass plates with Canadian balsam (index=1.540). A petrographic microscope using polarized light was used in the analysis of the thin sections.

The usual lengthy petrographic report has been shortened here to the essential items that deal with the problem at hand. The minerals enumerated in Table 1 are those found in the tempering materials of the pottery. The percentage of each mineral found in the 5 sherds studied from each area is shown. The percentage figures do not always total 100% due to traces of minerals, and the difficulty of ascertaining exact percentages.

It is apparent that all of the sherds from one area tend to have the same basic mineral components and that they differ as a group from the others. The most notable variations in tempering material are found in the 5 sherds from the Mimbres country, which came from more than one site, in contradistinction to the other collections, all of which represent material from single sites.

Point of Pines, Arizona. A thin section was prepared of local tuff used in the construction of the pueblos at Arizona W:10:50. This section showed a high percentage of pumice and glassy matrix, making up approximately 70%. Leucite made up an average of 20% of the minerals, while biotite, basalt grains, weathered obsidian (devitrified glass), and hematitic clays were contained in the remaining 10% of the rocks' composition.

Thin sections (5) of Gila Polychrome sherds from the ruins at Point of Pines contained large percentages of leucite and melilite, some basalt and obsidian in an aphanitic ferruginous glassy matrix. Inasmuch as leucite is a fairly uncommon mineral in tuffaceous rocks and is present in both the Point of Pines pottery and local tuff, it is probable that the pottery was manufactured locally.

Mimbres Area. The region from which the tempering material was collected seems to be a geologically complex region of medium to high temperature contact metamorphism intruded by several types of basalt. Granite is probably present in a minor amount. Weathering processes have been intense with only a minor amount of feldspars withstanding kaolinization. Evidences of slight secondary calcite and silicification are present.

The paste of the Mimbres area sherds does not resemble in its component parts the mineral complex of the paste of sherds from other areas. The porphyritic augite basalt, present in some of the sherds, is found in the Mimbres area. It would appear that this pottery could have been made from locally procured clays and that it was not traded into the Mimbres from any of the other sites tested.

Casa Grande. The thin sections show a large amount of clay bonding material in which isolated mineral grains are found. The predominance of quartz and the unusual lack of the feldspars is due to differential erosional properties of these minerals. With the exception of quartz all other minerals are extremely weathered and have been partially if not entirely converted into claylike minerals, some of which maintain the original form of the weathered crystal. Calcite is a secondary mineral.

It would appear from the thin sections that this pottery was made in an area surrounded by mountains of schistose and granite. The weathering seems to indicate that the collection area was a considerable distance from the source rocks. The calcite may indicate that the collection area was in a dry wash or arroyo in which caliche ($CaCO_3$) was deposited. Casa Grande is located some distance from mountains that are of schistose and granite, and the tempering material seems to be that which one could expect to find in the local area and suggests that the pottery might have been made locally.

University Indian Ruin. The collecting area appears to be close to a region made up of schist and gneiss, a metamorphic complex area. The presence of small amounts of orthoclase feldspar would indicate that the entire area is not completely composed of metamorphics, but that some granite is present. The plagioclase feldspars are not indicative of either metamorphic or igneous rocks, as they appear in each. The dark brown ferruginous claylike material is unidentifiable under the petrographic microscope. The nearly complete absence of the micas is unusual, as is the rarity of secondary calcite. The individual grains appear to have sharp edges and corners as though the tempering material were crushed from larger fragments.

From the above listed minerals and percentages it would be expected that all of the specimens were manufactured within the same general area and that the area would fit that of the region of the University Indian Ruin which lies close to gravel deposits emanating from the nearby mountains. Gila Polychrome from the University Indian Ruin could have been made from local materials.

Gila Pueblo. The minerals that appear in these sections imply that the collecting area is close to a region of intrusive and extrusive igneous rocks and possibly near a formation of limestone that has suffered hydrothermal alterations. Basalts (scoria) often carried

natrolite, thompsonite, and other zeolites (mineraloids) found in these thins sections. Alunite, found liberally in these sections, is an alteration product of rhyolites and andesites. One crystal of oligoclase plagioclase feldspar was observed that may be a remnant of a rhyolitic dike or formation. Bruncite is a common hydrothermal alteration product of some limestones. The calcite noticed in the thin sections may also have come from a limestone formation, as it did not have a secondary aspect.

The temper of the sherds from the Gila Pueblo collection present a more complicated problem, for the nearby Pinal Mountains out of which drains the stream that passes the pueblo, are not igneous and, therefore, are not the source of the minerals found in the sherds. However, some geologists believe that the drainage pattern was changed in times past, and that the drainage was once out of the mountains north of Globe. These mountains do contain the minerals found in the paste of the tested sherds. It might be possible then for the clays and gravels to have been nearby and for the potters to have used these deposits. It is of interest to note that Gila Pueblo is considered by archaeologists to be in the heartland of the Salado and in the center of the Gila Polychrome-making area, and yet of the 5 collections studied, the geologists who studied the problem (the junior author and Andrew F. Shride, Geologist for the Mineral Deposits Branch of the United States Geological Survey, Tucson) were only uncertain of the sherds of this area. The uncertainty probably comes from a lack of knowledge of the source of the alluvium.

A tentative answer to the old problem of the origin of Gila Polychrome would seem to be that it was a widely made pottery type with an area of manufacture stretching from at least the Mimbres on the east to the Gila-Salt Basin on the west and from Point of Pines on the north at least as far south as the Santa Cruz River near Tucson.

It should be pointed out here, however, that this answer is admittedly not definitive. The analysis does not *prove* that the 5 sherds from each of the 5 areas were locally made. The analysis does show that in the 25 sherds studied the tempering materials differ, and in relation to the area from which the sherds were originally collected the tempering materials are similar to those of the other sherds from the same area. This suggests that:

1. All Gila Polychrome did not originate from one site, nor from one area, but was a widely made type.

2. The mineral constituents of the paste are those that one could expect to find in the valleys close to the 5 localities studied.

3. Gila Polychrome may have been made at or near the University Indian Ruin, Casa Grande, Gila Pueblo, and Arizona W:10:50 at Point of Pines, and in the Mimbres area.

The study further suggests that binocular microscopic studies should be made of a large sample of Gila Polychrome sherds from the 5 examined sites to determine if all or a majority of the sherds conform to the results of this initial petrographic study.

It would seem that we can now say with some assurance that Gila Polychrome pottery was made widely throughout the Southwest and was not traded from one small area into the many and wide-spread sites at which it is found. Thus, we have answered in this study Haury's question as well as suggested that both Schroeder's and Smiley's theories that Gila Polychrome was traded into the Gila Valley and the Point of Pines area from another source may be incorrect.

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SOUTHERN CULT MOTIFS ON WALLS-PECAN POINT POTTERY *

Certain published designs from Walls-Pecan Point phase pottery are strikingly in the tradition of the so-called "Death Cult" of the Southeastern United States. Particular reference is made to 2 Walls Engraved bottles, illustrated by Phillips, Ford, and Griffin (1951, Fig. 111 g) and by Calvin Brown (1926, Fig. 278). The first of these, showing a winged serpent almost identical to those of Moundville, is at the University of Arkansas. The second, depicting skulls, long bones, and hands with oval markings at the palms, is at the University of Mississippi. The way in which these 2 vessels fit into the

* Paper read at Eleventh Southeastern Archaeological Conference, Moundville, Alabama, November, 1954. These remarks form part of a study aided by a Faculty Research Grant of the University of Mississippi.

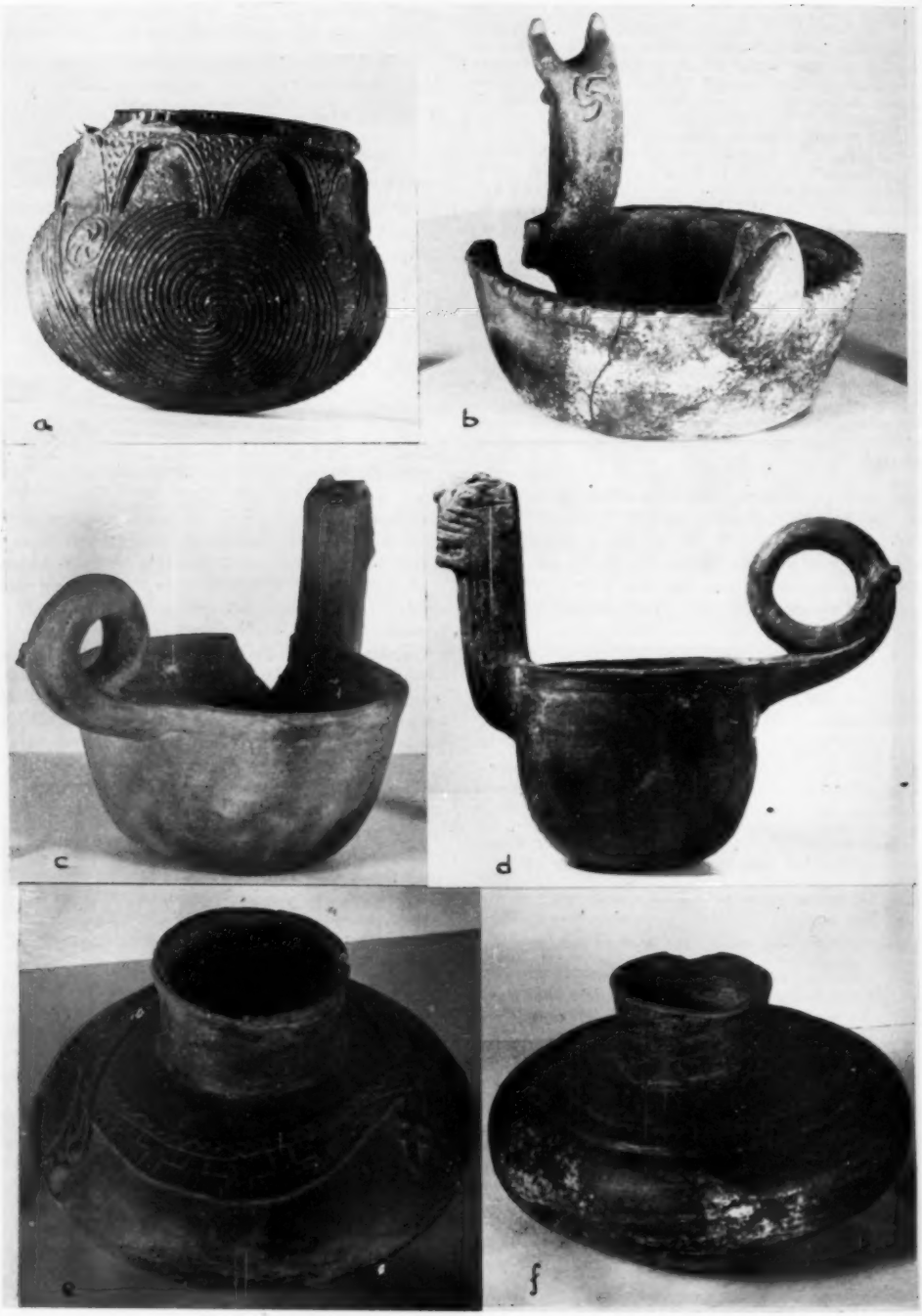

FIG. 1. Walls-Pecan Point pottery, showing Southern Cult motifs.

art of the Southern Cult is striking, but even casual examination shows that this holds true for the pottery of the phase as a whole to a markedly smaller degree. At most it appears to be "attenuated," or perhaps "undeveloped," Cult.

The remarks which follow are based upon an examination of over 1100 complete or virtually complete vessels. As far as I can tell, these are all from sites belonging to or closely connected with the Walls-Pecan Point "phase" or "focus," a cultural manifestation lying in small portions of eastern Arkansas, northwestern Mississippi, and southwestern Tennessee. The majority of the vessels were dug by amateur collectors, and so it is possible that in a few cases proveniences are wrongly given. Due, apparently, to the greater amount of digging in the more southerly sites, the material is especially representative of the Wallslike components. By and large, however, the assemblage of pottery seems generally characteristic of the phase.

The description by Waring and Holder of a decade ago (1945) is used as a guide to the Cult motifs. Because of the somewhat divergent nature of the Walls-Pecan Point designs, however, the classification of 8 motifs made by these writers is expanded slightly. Attention is thereby focused more effectively on those general correspondences which do exist.

The virtual absence of Cult designs on objects other than pottery should be stressed. In addition, the great importance of the bottle as a ceramic object on which Cult motifs occur (Waring and Holder 1945: 14) holds true to only a limited degree for the bulk of the Walls-Pecan Point material. Rather the motifs occur, often as minor elements, on effigy bowls, particularly those of serpents and human figures.

As one of the God-Animal beings associated with the Cult, "The *Rattlesnake*, naturalistic, horned, plumed, winged, anthropomorphized" is named by Waring and Holder (1945: 5). The horned snakes of the Walls-Pecan Point potters typically lack rattles, as well as numerous other features found at such Cult centers as Moundville or Spiro. A slight tendency is shown, however, for the so-called horned serpent to be associated with the few "pure" Cult designs which do occur. For this reason it deserves special mention.

Another feature of some interest which is held to be associated with the Cult is the "occipital hair knot" (Waring and Holder 1945: 15). Of the more than 1100 vessels examined from Walls-Pecan Point sites, 18 are human effigy bowls. Predominantly they are Bell Plain. Of these 18, 13 show the characteristic rolls of hair, either realistically or else suggested in a more conventionalized fashion. The percentage occurrence of this Cult feature is, then, a high one (72% of the human effigy bowls).

Turning to the 8 "motifs" recognized by Waring and Holder (1945: 3), we find the following situation (occurrences refer only to the complete vessels which I have examined):

1. *The Cross.* Very rare except as a minor element in the form of a swastika spiral or triskele, usually enclosed in a circle. As such, the cross occurs in 2 principal locations: (a) toward the shoulder of Rhodes Incised jars and, rarely, bottles (the body decoration is of an allied form) (Fig. 1 *a*); (b) on the back or top of serpent heads, on rim effigy bowls (Fig. 1 *b*, *c*). The spiral cross was noted on 9 Rhodes Incised vessels and 6 serpent effigies. One-third of the 18 Bell Plain and Walls Engraved serpent effigies showed this feature (33%). However, it was not seen on any of the 7 Neeley's Ferry Plain serpents.

2. *Sun Circles.* Absent.

3. *The Bilobed Arrow.* One possible example; very generalized in nature, however.

4. *The Forked Eye.* Ten examples, five of them associated with serpents (Fig. 1 *c-e*). But as a total of 28 vessels occurs showing beings of the sort usually referred to as serpents, the consistency of the association is not a high one (18%). The forked eye also occurs on nonserpentine subjects.

5. *The Open Eye,* or "ogee symbol." Ten or 11 examples, mostly on the shoulders of Bell Plain bottles (Fig. 1 *f*). Less frequently, the rims of shallow bowls, as seen from above, take on this characteristic shape. The motif is frequent on Moundville pottery, being one of the several links between that site and the Walls-Pecan Point phase (Griffin 1952: 236). Attention might be called, therefore, to a somewhat similar design, suggesting a variation on the "ogee" symbol, which occurs both at Moundville (Moore 1905, Fig. 7) and in southwestern Tennessee (Fig. 5). In each case, interlaced or superimposed serpents form an outline quite comparable to that of the "ogee" motif. The Tennessee example is of interest in that it is placed on the shoulder of a bottle in a way characteristic of the regular motif.

6. *The Hand and Eye.* Strictly speaking, no examples of this motif are found in the vessels under consideration. Apparently related Cult designs do occur in which the eye is replaced by a cross in a circle or by an ovate element (Waring and Holder 1945, Figs. 1, 7, *b-d*). Even if these are included as variants of the hand-eye motif, however, the occurrence on Walls-Pecan Point pottery is not much more impressive. A single specimen, a Walls Engraved bottle, shows an oval area at the palm of the hand.

7. *The Barred Oval.* Absent, although suggested by the marking in the palm of the hand in the last-mentioned example.

8. *Death Motifs.* Again it is necessary to subdivide the motif. The 2 variants of particular interest here are the skull and the long bones. The former is of limited occurrence, just 2 examples (Walls Engraved) being known. Bones occur with slightly greater frequency, once on a Walls Engraved bottle, in connection with skulls, and 3 times modeled on Bell Plain bottles.

This completes the motifs specifically mentioned by Waring and Holder. A few additional observations need to be made, however. While the hand and eye motif

is very rare, plain hands, without markings at the palm, occur somewhat more frequently (10 vessels). For the most part, these examples are modeled on Bell Plain bottles. In 3 of these cases, the hands occur in association with bones.

It has been pointed out that the forked eye is quite rare on the Walls-Pecan Point pottery. A much more usual facial treatment consists of grooves below but not contacting the eyes — as much associated, let us say, with the mouth or nose as with the eye (Fig. 1 *c*, *d*). In some cases, to be sure, the appearance of the grooves approaches atypical examples of the so-called "weeping eye." The grooves in question occur on 19 of the 28 vessels showing serpents (68%).

Finally, mention should be made of the "horned" nature of the serpents shown on Walls-Pecan Point pottery. Deer antlers are absent from the collections examined. Difficulty sometimes exists in determining whether a supposed set of horns is prominent and clearly hornlike (Fig. 1 *b*) or reduced and perhaps earlike (Fig. 1 *c*). I would, however, state the situation somewhat as follows: of the 19 "snakes" which show protuberances on the head, only 4, all examples of Bell Plain, have truly "prominent" horns (21%). This is to say that horns appear to be emphasized on only 14% of the 28 vessels showing "serpents." A general lack of emphasis on the "horned" concept is suggested which is in sharp contrast to the situation at, say, Moundville or Spiro.

Any conclusions to be drawn from the preceding observations would have greater reliability if the sample were larger. General trends, however, should be indicated. None of the Cult motifs occurs with great frequency. Those which are present tend to be simplified in form or to lack a prominent position. The small spiral crosses at the back of the serpent heads might be remembered in the latter connection. Hands occur with some frequency but almost always as plain, unelaborated motifs. The occasional association of hands and long bones does suggest the concept of the Death Cult, however. The horned serpent appears but generally lacks the specific features and elaboration likely to be found at the large Cult centers. And so on.

The problem of particular interest in all this was alluded to in the opening remarks, when the Walls-Pecan Point material was described as, at best, either an "attenuated" or "undeveloped" Cult. Does the small amount of art comparable to that from the Cult centers reflect a "watering down" of the Cult as it spread out from these centers? Or did the Walls-Pecan Point potters share widespread religious concepts out of which the Cult crystallized in certain sites and areas? Perhaps both factors were involved, but the degree to which each was present remains a significant problem. It cannot be answered on the basis of present data. However, similar analyses of other phases in the Southeast, which show both resemblances to and divergences from the great Cult centers, should be useful. These, together with more intensified investigations of Cult materials in the large centers — studies on the order of that by Waring and Holder but done quantitatively — should help shed light on the nature and origin of the Southern Cult.

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January, 1955

THE FIRST DENDROCHRONOLOGIST

In *The Ninth Bridgewater Treatise* of Charles Babbage, an English mathematician who lived over 100 years ago, is contained an appendix entitled "On the Age of Strata, as Inferred from the Rings of Trees Embedded in Them." The account is of particular interest since it defines the method of deriving chronology from treerings, and Babbage actually envisages the possibility of employing the method to secure archaeological dating.

I find that F. E. Zeuner has also called attention to Babbage's "remarkable case of vision in science." In view of the historical significance of Babbage's account, it has been thought worth republication here where it will be more available than in the original book.

"NOTE M

On the Age of Strata, as Inferred from the Rings of Trees Embedded in Them

"The indelible records of past events which are preserved within the solid substance of our globe, may be in some measure understood without the aid of that refined analysis on which a complete acquaintance with them depends. The remains of vegetation, and of animal life, embedded in their coeval rocks, attest the existence of far distant times; and as science and the arts advance, we shall be enabled to read the minuter details of their living history. The object of the present note is to suggest to the reader a line of inquiry, by

which we may still trace some small portion of the history of the past in the fossil woods which occur in so many of our strata.

"It is well known that dicotyledonous trees increase in size by the deposition of an additional layer annually [p. 257] between the wood and the bark, and that a transverse section of such trees presents a series of nearly concentric though irregular rings, the number of which indicates the age of the tree. The relative thickness of these rings depends on the more or less flourishing state of the plant during the years in which they were formed. Each ring may, in some trees, be observed to be subdivided into others, thus indicating successive periods of the same year during which its vegetation was advanced or checked. These rings are disturbed in certain parts by irregularities resulting from branches; and the year in which each branch first sprung from the parent stock may be ascertained by proper sections.

"It has been found by experiment, that even the motion imparted to a tree by the winds has an influence on its growth. Two young trees of equal size and vigour were selected and planted in similar circumstances, except that one was restrained from having any motion in the direction of the meridian, by two strong ropes fixed to it, and connecting it to the ground, at some distance towards the north and south. The other tree was by similar means prevented from having any motion in the direction of east and west. After several years, both trees were cut down, and the sections of their stems were found to be oval; but the longer axis of the oval of each was in the direction in which it had been capable of being moved by the winds.

[p. 258] "These preeminent effects are obvious to our senses; but every shower that falls, every change of temperature that occurs, and every wind that blows, leaves on the vegetable world the traces of its passage; slight, indeed, and imperceptible, perhaps, to us, but not the less permanently recorded in the depths of those woody fabrics. All these indications of the growth of the living tree are preserved in the fossil trunk, and with them also frequently the history of its partial decay.

"Let us now enquire into the use we may make of these details relative to individual trees, when examining forests submerged by seas, embedded in peat mosses, or transformed, as in some of the older strata, into stone. Let us imagine, that we possessed sections of the trunks of a considerable number of trees, such as those occurring in the bed called the *Dirt-bed*,* in the island of Portland. If we were to select a number of trees of about the same size, we should probably find many of them to have been contemporaries. This fact would be rendered probable if we observed, as we doubtless should do, on examining the annual rings, that some of them conspicuous for their size occurred at the same distances of years in several trees. If, for example, we [p. 259] found on several trees a remarkably large annual ring, followed at the distance of seven years by a remarkably thin ring, and this again, after two years, followed by another large ring, we should reasonably infer that seven years after a season highly favourable to the growth of these trees, there has occurred a season peculiarly unfavourable to them; that after two more years another very favourable season has happened, and that all the trees so observed had existed at the same period of time. The nature of the season, whether hot or cold, wet or dry, might be conjectured with some degree of probability, from the class of tree under consideration. This kind of evidence, though slight at first, receives additional and great conformation by this discovery of every new ring which supports it; and, by an extensive concurrence of such observations, the succession of seasons might be in some measure ascertained at remote geological periods.

"On examining the shape of the sections of such trees, we might perceive some general tendency towards a uniform inequality in their diameters; and we should perhaps find that the longer axes of the sections most frequently pointed in one direction. If we knew from the species of tree that it possessed no natural tendency to such an inequality, then we might infer that, during the growth of these trees, they were bent most frequently in one direction; and hence derive an indication of the prevailing winds at that time. In [p. 260] order to determine from which of the two opposite quarters these winds came, we might observe the centres of these sections; and we should *generally* find that the rings on one side were closer and more compressed than those on the opposite side. From this we might infer the most exposed side, or that from which the wind most frequently blew. Doubtless there would be many exceptions arising from local circumstances — some trees might have been sheltered from the direct course of the wind, and have only been acted upon by an eddy. Some might have been protected by adjacent large trees, sufficiently near to shelter them from the ruder gales, but not close enough to obstruct the light and air by which they were nourished. Such a tree might have a series of large and rather uniform rings, during the period of its protections by its neighbour; and these might be followed by the destruction of its protector. The same storm might have mutilated some trees, and half uprooted others; these latter might strive to support themselves for years, making but little addition, by stinted layers, to the thickness of their stems; and then, having thrown out new roots, they might regain their former rate of growth, until a new tempest again shook them from their places. Similar effects might result from floods and the action of rivers on the trees adjacent to their banks. But the effect of all these local and peculiar circumstances would disappear, if a sufficient number of sections could be procured from [p. 261] fossil trees, spread over a considerable extent of country.

"The annual rings might however furnish other intimations of the successive existence of these trees.

* "The reader will find an account of these fossil trees, and of the strata in which they occur, in several papers by Mr. Webster, Dr. Buckland, Mr. De la Beche, and Dr. Fitton, in the Transactions of the Geological Society of London, vol. iv. Series 2."

"On examining some rings remarkable for their size and position, let us suppose that we find, in one section, two remarkably large rings, separated from another large ring, by one very stinted ring, and this followed, after three ordinary rings, by two very small and two very large ones. Such a group might be indicated by the letters —

oLLsoosLLoo

where *o* denotes an ordinary year or ring, *L* a large one, *s* a small or stinted ring. If such a group occurred in the sections of several different trees, it might fairly be attributed to general causes.

"Let us now suppose such a group to be found near the centre of one tree, and towards the external edge or bark of another; we should certainly conclude that the tree near whose bark it occurred was the more ancient tree; that it had been advanced in age when *that* group of seasons occurred which had left their mark near the pith of more recent tree, which was young at the time those seasons happened. If, on counting the rings of this younger tree, we found that there were, counting inward from the bark to this remark- [p. 268] able group, three hundred and fifty rings, we should justly conclude that, three hundred and fifty years before the death of this tree, which we will call A, the other, which we will call B, and whose section we possess, had been an old tree. If we now search towards the centre of the second tree B, for another remarkable group of rings; and if we also find a similar group near the bark of a third tree, which we will call C; and if, on counting the distance of the second group from the first in B, we find an interval of 420 rings, then we draw the inference that the tree A, 350 years before its destruction, was influenced in its growth by a succession of ten remarkable seasons, which also had their effect on a neighbouring tree B, which was at that time of considerable age. We conclude further, that the tree B was influenced in its youth, or 420 years before the group of the ten seasons, by another remarkable succession of seasons, which also acted on a third tree C in its old age, at a period of 770 years antecedent. If we could discover other trees having other cycles of seasons, capable of identification, we might trace back the history of the ancient forest, and possibly find in it some indications for conjecturing the time occupied in forming the stratum in which it is embedded.

"The application of these principles to ascertaining the [p. 263] age of submerged forests, or to that of peat mosses, may possibly connect them ultimately with the chronology of man. Already we have an instance of a wooden hut with a stone hearth before it, and burnt wood on it, and a gate leading to a pile of wood, discovered at a depth of fifteen feet below the surface of a bog in Ireland: and it was found that this hut had probably been built when the bog had only reached half its present thickness, since there were still fifteen feet of turf below it.

"The realization of the views here thrown out would require the united exertions of many individuals patiently exerted through a series of years. The first step must be to study fully the relations of the annual rings in every part of an individual tree. The effect of a favourable or unfavourable season on a section near the root must be compared with the influence of the same circumstances on its growth towards the top of the tree. Vertical sections also must be examined in order to register the annual additions to its height, and to compare them with its increase of thickness. Every branch must be traced to its origin, and its sections be registered. The means of identifying the influence of different seasons in various sections of the same individual tree and its branches being thus attained, the conclusions arrived at must be applied to several trees under similar circumstances, and such modifications must be applied to them as the case may be; [p 264] and before any general conclusions can be reached respecting a tract of country once occupied by a forest, it will be necessary to have a considerable number of sections of trees scattered over various parts of it."

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F. E. Zeuner's remarks are contained in *Dating the Past*, Methuen, London, 1952. Third edition, revised (400 pp.).

The full citation to Babbage's account (reprinted here) is: *The Ninth Bridgewater Treatise, a Fragment*, 2nd edition, John Murray, London, 1838. (Note M, "On the Age of Strata, as Inferred from the Rings of Trees Embedded in Them," pp. 256-64.)

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December, 1954

A PIT HOUSE OF THE GALLINA PHASE

As part of the Gallina project in north central New Mexico, which has been carried on by the University of New Mexico since 1934 under the direction of Frank C. Hibben, a pit house site was excavated in the summer of 1950. Excavations were accomplished with the able assistance of Emily Gray and 4 local workmen. The author was in charge of the field work. This site was selected because the pit house had been the least investigated of Gallina architectural types, and also because it was in the as yet unworked southwestern periphery of the Gallina complex. Furthermore, surface indications showed this particular site to be a Gallina pit house of unusual size.

The Archuleta pit house, as this site was called, lies on the spur of a ridge approximately 2 miles northeast of the town of La Jara, New Mexico, on the ranch of R. Archuleta. Numerous canyons, some with permanent water, issue from the base of the San Pedro or Nacimiento mountain range to the east. The site itself is located

on one of the many ridges found between 2 such canyons, La Jara and Naranjo. The country surrounding the site is typical of the Woodland zone found along the foot of the mountains with the ridges covered by open stands of juniper and pinyon pine, with sage covered valleys between. The vegetation rapidly changes to that of the Transition zone toward the mountains, 1½ miles distant. Along the base of the mountain are several fine springs, insuring a constant supply of water.

The Archuleta site is one of many in this area. Circular depressions from 6 to 9 m. in diameter are the usual surface indications along with a few scattered utility and Gallina Black-on-white sherds. Usually the pit houses of the western periphery of the Gallina occur singly and not in groups as is the case in those more centrally located. Occasionally the pit house depressions in the La Jara area show on the surface to one side a number of burned adobe lumps with beam and split wood impressions.

The depression of the Archuleta site, 15 m. in diameter, was larger than most, with an abundance of sherds found on the north slope. An area 5.2 m. to the west of the main depression was covered with many large-sized blocks of burned adobe bearing beam impressions. The Archuleta site presented 2 major problems: what type of structure an isolated pit-house depression of this size would reveal in relation to previously excavated Gallina remains, and what type of structure, if any, lay to the side of the pit-house depression (Fig. 1).

The indications for a possible surface structure, evidenced by the burned adobe to the west of the depression, were investigated while the removal of the main fill of the pit house was carried on. The results were disappointing. The adobe blocks, most of them fired to a bright red brick consistency, lay on or within a few centimeters of the surface. There was no particular pattern except that more blocks lay with the beam impression on the under side. The adobe blocks, averaging 10 cm. by 15 cm. by 10 cm., can be divided into 3 groups: first, those with parallel beam impressions on one surface, the other surface smoothed with occasional finger impressions; second, adobe blocks with beam impressions at right angles to each other, one set normally of smaller diameter; and third, those which are flat on one surface, the other showing impressions of split slabs of wood. Of these types, the first is predominant, the beam impressions indicating the use of parallel peeled poles about 8 cm. to 10 cm. in diameter. The presumed structure represented by the burned adobe pieces was not of great size or height since the debris was scattered and not of great bulk. There was no indication of any floor. A number of possible postholes were found but their pattern seems indecisive (see Fig. 1). The fill contained no artifacts except pottery. This pottery was of the same type and concentration as in the pit house proper.

To further test the connection of the burned adobe area with the pit house and to test the space on the periphery of the pit house proper, a trench was dug between the two to a depth even with the top of the pit house banquette. The trench was sterile of cultural material and revealed no additional structure or even evidence that this soil had been disturbed. Although the results of this work were not particularly enlightening, the following observations can be made: The adobe pieces may indicate a jacal structure or a storage bin

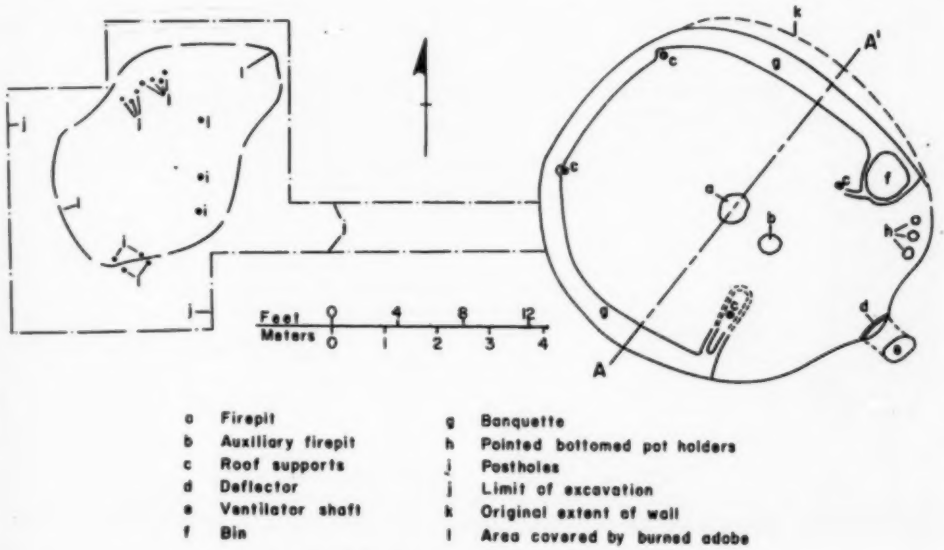

Fig. 1. Map of Gallina phase pit house and adjacent area.

with horizontal wooden members and adobe plastered in between. Such a bin would leave little evidence in the form of postholes. The adobe blocks also match those from the fallen and burned roof of the pit house proper. It may be that after the destruction of the pit house by burning, portions of the burned and fallen roof were removed to this area. The postholes may also represent some sort of indefinite stockade formation similar to those Hall found around the Gobernador pit houses (Hall 1944: 28).

The Archuleta pit house itself was cleared in levels, by quarter sections. Although the surface depression showed a diameter of 15.2 m., the actual structure occupied only the inner portion, the circular pit house being 7.11 m. across and 2.28 m. in depth. The unusual size of the depression was apparently due to the location of the pit house on a slight knoll, so that erosion of the material from the surrounding area into the pit house excavation gradually enlarged the whole depression. Test trenches on the east and west sides did not show a profile which indicated the deliberate piling of excavated material around the periphery of the depression or disturbance of the soil surrounding the pit house.

The pit house was filled by hard-packed, washed sand and adobe layers in the upper levels. Beneath this upper sterile fill were fragments of adobe from the disintegrated roof and walls and considerable charcoal, evidence of burning. Moreover, in the area where interior features rose above the floor level, the layers of burned material, principally from the roof, slanted upward over these features, especially over the bin and banquette on the west side, with subsequent washing action filling the area both above and beneath this layer. Finally a fine white ash layer covered most of the floor, while similar layers occurred above the east bin. This seems ample evidence that the pit house was burned.

The construction follows in major outline the pattern established for Gallina architectural forms (Hibben 1948: 33-5). Thus the interior features include 4 wooden uprights, 2 bins, a banquette, and a fire pit, auxiliary fire pit, and ventilator, all oriented in a direction of 40° east of south. While the arrangement of some of the interior features deviated from the established pattern of most Gallina forms, this may be the usual aspect of the pit house structures (Bahti 1940: 58). The 4-post roof support arrangement is a usual feature of all Gallina forms. The actual construction of the roof which these supported is not certain but the following evidence exists. The 4 charred ends of the uprights as well as burned roof material attest to the collapse of the roof from fire, the greater amount of burning occurring on the south and west sides. From other roof constructions it seems that the 4 uprights supported a rectangular superstructure on which the roof rested. Of 11 roof timbers examined, eight proved to be ponderosa pine, three to be juniper. However, since the remains consist both of true timbers and what are best described as slabs, the arrangement of them in the roof is open to some question. No evidence exists for slanted roof members around the periphery between the superstructure and the juncture of the banquette with the wall. The walls, where they stand to a height of over 2.4 m., are also devoid of such evidence, suggesting that the supports rested on the surface of surrounding ground (Fig. 2).

The roof adobe, like that of other Gallina structures, indicates a series of parallel peeled poles 10 cm. in diameter about 7 to 8 cm. apart covering the main section of the roof. The openings thus created were then filled with adobe pushed from above in between the timbers. The remainder of the roof adobe shows the impressions of slabs of wood. It is suggested that they

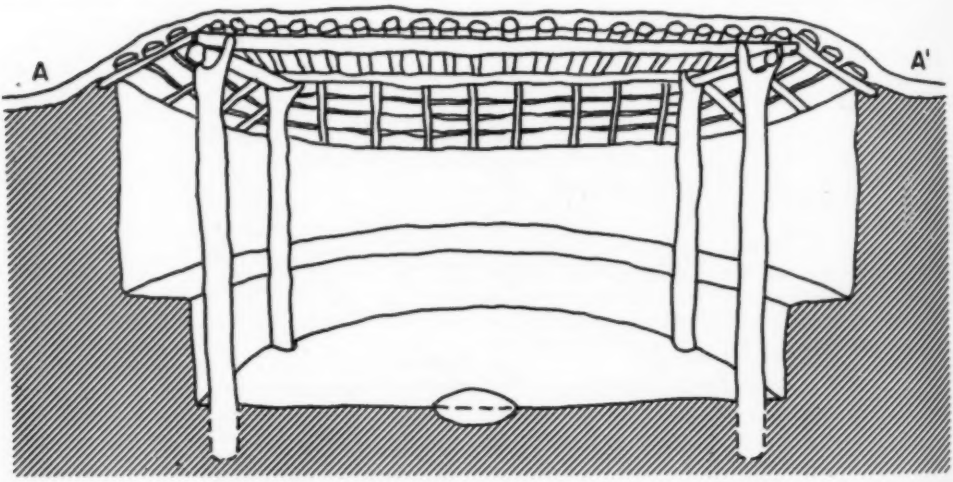

Fig. 2. Hypothetical reconstruction of roof of Gallina phase pit house.

FIG. 3. Corrugated jar with ledge lugs, from Archuleta pit house.

were used to cover the area between the edge of the pit house and the center section. The position of the slabs in the fill also suggests this. Possibly the slabs rested at right angles on widely spaced poles which extended out from the square superstructure to the surface. Using this evidence, the hypothetical reconstruction of the roof found in Figure 2 is postulated. It shows some deviation from the usual viga, thatch, and adobe method used in similar pueblo structures.

The banquette found intact along the western and northern wall is 76 cm. high and offset 55 cm. from the wall. It was partially destroyed on the eastern side of the pit house where it was constructed of cultural fill in contrast to the remaining portion which was formed of the undisturbed hard packed sand in which the pit house had been excavated. It was covered by a multiple layer of red-brown adobe plaster as were the interior walls of the pit house.

The bins on the east and west were aberrant in that they were not identical. The bin on the west, although badly broken at the eastern end, is of normal Gallina construction, and quite probably at one time terminated at or just beyond the southwestern support. However, the bin on the east side, also of puddled adobe, was arc-shaped, with another curving wall leading to the southeast support. It was very similar to some of those found by Hall in his Rosa phase pit houses (Hall 1944, Figs. 3, 12).

Another unusual feature is the placement of the fire-screen in a position across the front of the ventilator shaft opening rather than between the bins. It is merely an adobe wall curving out into the room, which deflects the flow of the air upward from the ventilator shaft (Fig. 1). The auxiliary firepit, usually located either within the deflector or just in front of it, retained its position minus the deflector. It was a large bell-shaped excavation in the pit house floor filled with ashes, rock fragments, and potsherds. The usual Gallina arrangement was a shallow auxiliary firepit filled with coals for cooking or holding the pointed-bottom pots, while the main firepit was the deep one. However, the main firepit here was only 15 cm. deep, lacking even the coping around the edge. The floor was an adobe coating over the virgin sand. The southern portion of the floor from the bins south was raised nearly 30 cm. On the southeast side in this area there were 3 depressions in a row, apparently holders for pointed-bottom pots, a feature previously noted for other Gallina structures.

On the east side is evidence of reuse and reconstruction of the original features. The remains of the banquette on this side of the house contained a number of sherds and it and the inner wall were probably rebuilt after the pit house had been inhabited for some time. The lack of similarity between east and west bins also suggests that the reconstruction on the east side occurred at a later date.

The assemblage of artifacts found in the fill is typical of the Gallina complex. They are listed here and similar assemblages have previously been described elsewhere (Hibben 1938, 1948; Mera 1938; Bahti 1949).

Stone.

Manos: 6 one-faceted (5 whole, 1 fragmentary); 5 two-faceted (2 whole, 3 fragmentary); material, fine-grained sandstone.

Metates: 2 with grinding surface slightly concave; 1 whole of dark igneous rock, the other of sandstone.

Ax grinder (?): rough, rectangular, sandstone block with groove used for abrasion, probably to sharpen tools.

Polishing stone: black basaltic pebble with high sheen from use.

Hammerstone: quartzite.

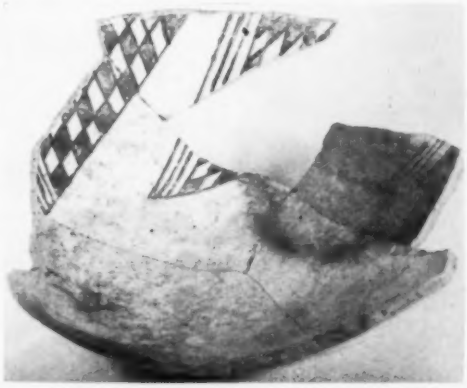

FIG. 4. Fragmentary Chaco II Black-on-white ware bowl.

Scrapers: 2 quartzite, 1 obsidian.

Worked flake: obsidian.

Unworked flakes: 7 obsidian.

Bone.

Large rib awl: Elk.

Antler knife: Elk.

Beads: 2 deer bone.

Clay.

Pot plugs: 2 of unfired adobe.

Worked sherd: shape suggests it was for scraping bowls.

The only artifacts that are especially significant are those of elk bone, which are distinctive of the Gallina complex (Hibben 1948: 33). The remaining bones in the fill include the following: elk, deer, cottontail, jackrabbit, and prairie dog. The turkey is absent. Human bones recovered included the petrous portion of a right temporal, one tarsus, and a cervical vertebra. The only other important finds were kernels and fragments of burned corn and cobs, common in Gallina ruins.

The most significant aspect of this whole site was the pottery found. In previous work, as pointed out by Mera and Hibben, there has been an amazing paucity of trade wares (Mera 1938: 243; Hibben 1949: 201). Mera reported 6 potsherds, three identifiable as Chaco II, Santa Fe Black-on-white, and affinis Mesa Verde Black-on-white for his survey (1935: 10), while Hibben reported but 6 cord-marked sherds from his work (1949: 201). There is also unpublished a Chaco Black-on-white jug from the floor of Mera's pit house (Mera 1938: 238) which is in the collection of the Laboratory of Anthropology in Santa Fe. The Archuleta pit house had a satisfying amount of trade wares of the Chacoan tradition along with an assemblage of typical Gallina wares. The sherds are tabulated in Table 1. The following comments serve only to highlight the situation.

There is a preponderance of utility ware, an aspect previously noted in other pit houses (Hibben 1948: 33). Gallina Plain Undecorated ware is here grouped with Gallina Black-on-white. This combination seems valid, since no indication of a difference in paste or use of the paddle and anvil method was apparent which would allow a separate classification. The trade sherds, probably representing not more than 5 separate vessels, are of the corrugated variety and are indistinguishable from typical late Chaco II and early Chaco III corrugated wares (Hawley 1934: 45-7). Of real interest is the recovery of one whole corrugated pot (Fig. 3) with ledge lugs. It was found deliberately crushed under the whole metate in the southeastern area behind the bins. Also significant is a partial bowl of Chaco II Black-on-white ware (Fig. 4), with paste similar to sherds from Chaco-like sites at the eastern foot of the Lukachukai Mountains (Stanley Stubbs, personal communication). The design of this bowl is closest to that described for Puerco Black-on-white (Hawley 1936: 34). It is puzzling that four of the 6 sherds which comprise the bowl came from within the east banquette, while the other two came from the ash fill of the auxiliary pit. The 3 sherds within the banquette were found in checking the construction of this feature on the west side of the room. It indicates that the bowl had been discarded before the pit house was remodeled on the western side. Other pieces of pottery include 2 partial Gallina utility ware pointed-bottom cooking pots, 1 nearly complete utility ware ladle, and 2 small bowls of utility ware paste. Also, there is 1 complete Gallina Black-on-white bowl which has a decoration of 2 parallel lines spiraled from the center with hatching to suggest a snake (Fig. 5).

By means of dated trade pottery and treering dating, we can establish very nearly the period when the structure was used. The treering dates determined are A.D. 1215 for a roof log section and 1245 for one of the wooden roof slabs of the Archuleta pit house (Smiley 1952: 19, Site Bg 50). The 1215 date is stated to be very near the outside of the tree, indicating the structure was occupied during the middle part of the 13th

TABLE 1. Sherds found in Gallina phase pit house.

	FILL		FLOOR	
TYPE	NO.	%	NO.	%
GALLINA PLAIN UTILITY				
Fine Tempered Untextured	181	33.9	234	43.8
Rim Fillet	2	0.4	--	--
Neck-banded	1	0.2	3	0.6
Coarse Tempered Untextured	1	0.2	4	0.7
Total	185	34.7	241	45.1
GALLINA BLACK-ON-WHITE				
Decorated	9	1.7	7	1.3
Undecorated (PLAIN UNDECORETED?)	13	2.4	14	2.6
Neck-banded	--	--	1	0.2
Total	22	4.1	22	4.1
CHACO CORRUGATED	3	0.6	43	8.0
P II KUSHEKAFT CORRUGATED	1	0.2	17	3.2

FIG. 5. Design on interior of Gallina Black-on-white bowl.

century. The trade pottery found is normally considered to be somewhat earlier than this, representing a period from A.D. 900 to 1100. While its presence in a structure of later date is not incongruous, the evidence that some of it was discarded before the final reconstruction suggests the possibility of earlier use of the structure than that given by treering dates. Previous dates reported for Gallina pit houses are 750xx, 761xx, and A.D. 1106 (Hibben 1948: 35). The first two are in question since they may well represent sites of the Rosa phase (Hibben, personal communication), which leaves Mera's pit house as the only other dated Gallina pit structure. The tower and unit house at Rattlesnake Point yielded dates of 1085, 1087, 1092, and 1223 respectively and were closely associated with the pit house in that group (Hibben 1949: 34-5). The pit house at the Cuchillo site was undated. Since most of the late Gallina ruins date in the middle of the 13th century, a similar date for this pit house extends this form into the late stages of the Gallina phase. It is interesting that the continuance of the pit-house form here took place without any of the specialized ceremonial functions found in other areas. Both the pottery and pit-house forms of Gallina indicate a tenacity for continuing the traditions of a way of life long abandoned by the rest of the Southwest.

The Archuleta pit house suggests 3 major conclusions. First, the pit-house tradition carried well into the last stages of the Gallina complex and was contemporaneous with other architectural forms. Since pit houses appear here to have served only as dwelling units, this makes the Gallina one of the last structures in the Southwest to use unspecialized pit structures. Second, while the general pattern for interior features is found throughout Gallina architectural forms, variations on the theme, especially in pit houses, are likely to occur. Finally, the site contains sufficient trade ware of Chacoan types to suggest a more definite contact than was previously suspected between Chacoan and Gallina groups in the Southwestern Gallina area.

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February, 1955

PATINATION AND AGE RELATIONSHIP IN SOUTH GEORGIA FLINT

Previous publications have called attention to the problem of flint decomposition or alteration in artifact and workshop materials from Archaic horizons in coastal Georgia. On the Macon Plateau, Georgia, there are stratigraphic indications of a prepottery horizon characterized by an old artifact assemblage of stemmed and concave-based projectiles, a wide range of cutting tools, both scraper and knife categories, all exhibiting partial or complete chemical alteration of the material (Kelly 1938). Related sites showing similar phenomena of altered flint, in contexts implying Archaic quarries or workshops, have been found in archaeological surveys at Lane Springs in northern Decatur County, Georgia, and in Kinchafoonee, in a Highway 19 road profile on the outskirts of Albany, Georgia (Kelly 1950). Recently, Kelly summarized these and other occurrences indicative of the widespread distribution of such materials over the entire coastal plain of Georgia (Kelly 1954). The difficulties of utilizing decomposed flint for chronometric studies were also summarized (Kelly 1953).

The Wheeler Collection from Donaldsonville, Georgia, consists of several hundred dart points and cutting tools picked up over a number of years by a local sportsman while hunting along the lower reaches of the Chattahoochee River. In this collection, one of the authors noted 6 unusual projectiles, exhibiting a remarkable glazed or "varnished" effect, a dark mahogany patination, which appeared in contrast to the usual creamy to ocherous look and feel of the nubbly, friable "rotten" flints of south Georgia. There was a suggestion of wear or chemical polishing of the sort attributed to waterworn specimens, or to the phenomenon known in the west as "desert varnish." The 6 specimens from the lower Chattahoochee were sent to A. D. Krieger, Archaeologist, University of Texas, who also remarked this waterworn or varnished appearance.

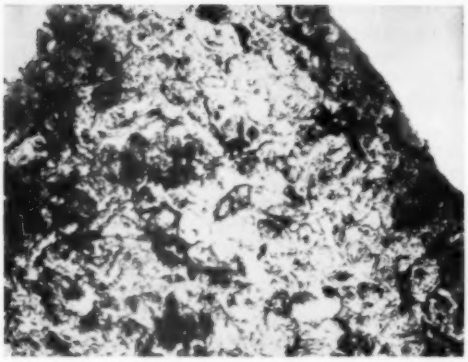

FIG. 1. Photomicrograph (enlarged about 10 times) of cross section of projectile point made of flint composed largely of foraminiferal tests. Iron oxide (black), which is disseminated rather evenly through the flint, appears to be more abundant at the margins of the specimen (upper right and upper left), where it is hydrated. This marginal hydration of the iron oxide, present in the flint as an impurity, gives the flint its patina.

These seeming waterworn or "varnished" specimens have recently been subjected to laboratory analysis by the Georgia State Geological Survey. These materials, and others from the North Georgia Piedmont, blue to gray cherts which exhibit no surface modification although considered on archaeological grounds to be Archaic or prepottery in the local chronology, have been subjected to thin sectioning and microscopic examination in polarized light. Petrographic techniques permit study of the microstructure of the specimens, and identification of the various mineralogical constituents.

The Wheeler specimens are composed mainly of the silicified tests of foraminifera. The forams belong to the family Miliolidae, two of which, according to S. M. Herrick of the U.S.G.S., are *Spiroloculina* sp. and *Quinqueloculina leoneusis*. These are very common in the Flint River formation of Oligcoene age; they are, in fact, index fossils for the Oligocene epoch.

The thin sections of the Wheeler specimens (Fig. 1) show clearly that the patination is the result of weathering. The flint contains thousands of disseminated specks of iron oxide, in variable states of hydration. Near the surface of the specimens and in minute cracks within them, where the iron oxide has been well exposed, hydration is complete. The glossy sheen of the patina is due to a thin coating of goethite (hydrated iron oxide). A similar glossy sheen is seen in geodes that are coated by goethite.

The Wheeler specimens well illustrate one application of regular petrographic techniques to the study of artifacts. A single thin section was sufficient to date the material geologically, show where the material came from, physically explain the patina, demonstrate that the patina did not require special conditions for its formation, and show that "waterwear" was in this case due to chemical activity which smoothed out the sharp ridges of the original chipping.

From the data in hand, the authors would suggest that the main factors determining the kind of patination on a flint and the time required for patination to occur are: (1) the kind of impurities in the flint; (2) the microstructure of the flint; (3) the permeability of the flint, which is closely related to (1) and (2); and (4) the soil conditions where the flint reposed.

A comparison of the patinae on different flints, for chronological purposes, should consider all these factors. The first 3 factors are best studied in thin section.

KELLY, A. R.

1938 A Preliminary Report on Archaeological Explorations at Macon, Ga. *Bureau of American Ethnology, Bulletin* 119, pp. 1-68, *Anthropological Papers No. 1*. Washington.

1950 An Early Flint Industry in Southwest Georgia. In "Short Contributions to the Geology, Geography, and Archaeology of Georgia," *The Geological Survey (Georgia) Bulletin* 56. Atlanta.

1953 Age Measurements in Decomposed Flint. In "Short Contributions to the Geology, Geography, and Archaeology of Georgia," *The Geological Survey (Georgia), Bulletin* 60. Atlanta.

1954 Mid-Coastal Archaic in Georgia. *Southern Indian Studies*, Vol. 6, pp. 14-27. Chapel Hill.

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March, 1955

REVIEWS

EDITED BY RAYMOND H. THOMPSON

Theory of Culture Change. The Methodology of Multilinear Evolution. JULIAN H. STEWARD. University of Illinois Press, Urbana, 1955. 244 pp., 5 tables. $4.00.

In a collection of papers spanning some 20 years of work, Steward argues persuasively that cultural change consists of complex, continuing processes, rather than isolable acts or events of unitary character ("diffusion" versus "independent invention"). In this respect his approach represents a considerable departure from such "theory" as is implicit in traditional archaeology, with its greater emphasis on the description of discrete cultural phases than on the reconstruction of connective links and trends cementing successive phases together into intelligible developmental sequences. With the increasing preponderance of studies of cultural change in archaeology as well as anthropology this volume assumes as much importance for the prehistorian as for the student of contemporary societies, even though only a few of the papers are directly concerned with the interpretation of archaeological data.

The book is divided into a section dealing with "concepts and methods," comprising 5 chapters, and a somewhat longer section dealing with "substantive applications." With one brief exception, the latter consists of previously published papers in more or less modified form, including Steward's well-known studies on the organization of hunting bands, on ecological aspects of Southwestern society, and on the development of early civilizations. Much of the earlier section is new, however; unpublished discussions of cultural ecology, national sociocultural systems, and the contrast of culture area with cultural type have been added to earlier contributions on multilinear evolution and the concept of sociocultural "levels."

Essentially, the author's approach is epitomized by a series of heuristic concepts that repeatedly underlie his substantive discussions, although not all of them are adequately explained or illustrated. Cultural ecology, as used by Steward, refers to the environment not only as a generalized permissive or limiting factor, but also as a constellation of critical local features that necessitate particular adaptations through a genuine "creative process." Multilinear evolution is "an affirmation that significant cross-cultural regularities exist but a denial that such regularities must pertain to all human societies. . . . It endeavors to determine recurrent patterns and processes and to formulate the interrelationships between phenomena in terms of 'laws'" (pp. 5, 14). These laws are viewed as strictly cause-and-effect relationships, with the independent operation of identical causality in parallel cases as a crucial methodological feature.

Levels of integration are described as qualitatively distinguishable aspects of any sociocultural system (national, village, and family levels are selected for illustration), which, for purposes of analysis at least, may be regarded as developing at different times and through different processes. Steward suggests that the formulation of cross-culturally valid comparisons — and thus also the observation of regularities from which "laws" may be deduced — depends upon the utilization of examples at the same level of complexity. Cross-culturally valid types are defined by the independent recurrence of identical cultural "cores," without reference to the host of highly variable "secondary features" which "are determined to a greater extent by purely cultural-historical factors" such as random innovations or diffusion (p. 37). Finally, the nexus of basic institutions and processes that forms the cultural core apparently centers mainly in the ecological setting, the organization of subsistence and production, and the level of integration, but is regarded as being empirically determinable rather than rigidly defined.

The only real test of a theoretical system of this complexity comes with its implementation over the years in empirical work that significantly alters the accepted fabric of scholarship. This reviewer lacks the historical perspective to assess Steward's cumulative influence on his contemporaries and students, but the impression remains clear that at least some of the papers — for example, those dealing with Basin-Plateau sociopolitical groups, band organization, and Southwestern ecology — had a profound original effect and are still important guides for substantive research. Certainly, moreover, his was among the earliest and most persuasive voices in support of such currently accepted themes as the integration of archaeological with ethno-historic and ethnographic materials, the re-examination (after a period of desuetude following the earlier excesses of geographical determinism) of cultural-environmental relationships, and perhaps in more recent years the renewal of an explicitly comparative study of structure and evolutionary development in more complex societies. Thus it would appear that the approach Steward outlines here recommends itself to the archaeologist by both its inherent sense of strategy and its continuing productiveness of insights.

Certain reservations may be offered tentatively, however, about the extent to which Steward has yet provided an adequate *general* theory and methodology for studies of culture change and process. In the first place, the only suggested causal explanations are of an ecological nature, and their range of potential application is somewhat limited by Steward's concession that "the simpler cultures are more directly conditioned by the environment than advanced ones" (p. 40). At least in the case of complex, civilized societies, moreover, it may be wondered whether the stress on providing causal explanations does not lead to the artificial isolation of a few highly abstract, misleadingly self-generating qualities such as population pressure, irrigation requirements,

and the like, although in reality these were bound up in a mutually dependent network of effect and cause. Secondly, one may question whether "it is only when one compares two historically independent areas that it is possible to stipulate that a particular set of phenomena are causally interrelated" (p. 88). Comparison is certainly one mode of historical validation, but there are always difficulties over the real degree of similarity between the compared features and areas. Is "science" always "generalizing" and "history" always "particularizing" (p. 14), or is an alternative, and equally scientific, mode of explanation possible that is based mainly on the intensive analysis and "intuitive reasonableness" of a particular case? And thirdly, it should be reiterated that Steward is avowedly interested only in delineating broad cultural types and patterns of interaction rather than in explaining the more variable "historically derived features" which account for the uniqueness of each culture (p. 134). It remains to be seen whether a convincing picture of cultural change as process can be provided on this basis, or whether we will only have acquired a more suggestive taxonomy of change with which to return to more congenial studies of the concrete interplay of variables (including those stressed by Steward, but also others) in their local settings.

The net effect of these reservations on Steward's total construct should not be misconstrued. Level of integration, cultural ecology, and the comparison of essentially independent cultural manifestations that share a core of functionally similar basic features, for the reviewer at least, remain among the most powerful analytic tools available to the archaeologist for the interpretive reconstruction of cultural change out of the midden record.

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Proceedings of the Thirtieth International Congress of Americanists [Cambridge, 1952]. Royal Anthropological Institute, London, 1955. xxx+249 pp., illus. £3.3.0.

Eighteen of the 37 papers in this volume are archaeological. With one exception — a comparison of 2 flakes found at Kuaua pueblo, New Mexico, with Paleolithic artifacts from Spain — the articles are limited to Latin America. The absence of contributions to United States archaeology is not surprising, since few North American specialists appear to have been able to make the trip to Cambridge, but one might have expected some discussion of the Arctic area by our Danish colleagues.

Mesoamerica is the subject of ten of the archaeological papers and two of the abstracts. Alberto Ruz Llhuillier's summary of his finds at Palenque will perhaps arouse the greatest interest, since he has appended to it an illustrated account of his subsequent discovery of a burial in the pyramid underlying the Temple of the Inscriptions. He repeats his belief that the similarities of this structure to Egyptian pyramids are coincidental, and that American Indian civilizations have developed independent of any influences from the high cultures of the Old World. In another noteworthy article, J. Eric S. Thompson reconstructs the character of the ancient Maya by examining in turn the mentality and outlook of their present descendents, the historical records, and the art and architecture of the prehistoric sites. He concludes that love of orderliness, moderation, respect for others, group cooperation, obedience, submergence of the ego, fatalism, and a deeply religious feeling have been the outstanding elements of Maya character throughout the last 12 centuries and that the first of these is primarily responsible for Maya intellectual achievements. Other papers on Mesoamerica are concerned with epigraphy, art, and religion. These would require a specialist to evaluate them.

In contrast to the emphasis upon Mesoamerica, only 3 papers are devoted to the Central Andes. They contain a flat contradiction: on the one hand Paul Kosok, in discussing the significance of the pre-Inca and Inca roads, minimizes the importance of sea transportation in the area; while on the other hand Thor Heyerdahl, in a restatement of the background and results of his *Kon-Tiki* expedition, creates the impression that the Peruvians were expert mariners. For Kosok, "the large balsas that could carry a considerable number of men and large quantities of goods were characteristic only of the Guayaquil Bay region in Ecuador, including the Tumbes area along the extreme northern coast of Peru. . . . There is no historical or archaeological evidence that the ancients along the rest of the Coast of Peru used anything but 'cabellitos,' the small reed boats holding one or at most two persons." Heyerdahl, on the other hand, cites rather convincing historical and archaeological evidence that large balsa rafts were distributed throughout the Central Andes, although he agrees that their source of materials and place of greatest concentration were in the north.

In the only paper on the Northern Andes, G. H. S. Bushnell discusses the stone carvings of Manabí, Ecuador, against the background of his own excavations on Santa Elena Peninsula. He concludes that "the slabs and a sample type of chair appear to date from before the Manteño period, whereas the more usual chairs with figure supports, and the human figures, are Manteño." All are apparently earlier than the Manteño-Inca period. Two papers and an abstract are concerned with that part of the Southern Andes which is included within Argentina. All three are descriptive, one of sites, a second of bronze artifacts, and the third of pottery figurines.

An article on the *sambaquis* of the Brazilian coast and an abstract on Tupi-Guarani pottery from Pirassununga, in the interior of Brazil, complete the list of archaeological contributions. In the former, Luiz de Castro Faria, refutes the common belief that some sambaquis are natural accumulations of shells, and describes

his own excavations in the sambaqui of Cabeçuda, where he unearthed 125 skeletons during the course of 2 summer's work.

Comparing the papers with those delivered at archaeological meetings in the United States, one is struck by the relatively small amount of attention devoted to pottery and chronology. There is only slightly more functional interpretation, with a few notable exceptions such as Thompson's and Kosok's papers. The volume is primarily factual.

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Ancient American Pottery. G. H. S. BUSHNELL AND ADRIAN DIGBY. Pitman Publishing Corporation, New York, 1955. xii+51 pp., 80 pls., 4 color pls., 1 table, 2 maps. $8.50.

This volume is one of the Faber Monographs on Pottery and Porcelain, a series covering the "ceramics of all countries and periods." The 22 titles published to date have been concerned with subjects such as German Porcelain, Early Islamic Pottery, French Faience, Ming Pottery and Porcelain; the present volume is the first to deal with New World ceramics, either ancient or modern. All the monographs are written on a semi-popular level, with "over 100 photographs" in each volume, four in full color. The photographs in this selection are of extremely high quality and serve very well to illustrate the textual material. Since most of the specimens are from the collection of the British Museum they are quite valuable in that this material is not usually available to the American investigator. The coverage of *Ancient American Pottery* is rather uneven. Only the "high centers" of the New World, the Southwest section of the United States and Central and South America are considered. In South America, as might be expected, emphasis is on the Andean areas.

The material on the Southwest is not well balanced. The few pages on the Anasazi are devoted to a general description of cultural and archaeological background, followed by a summary of the development of pottery manufacture in the northern Southwest. Half of the 2 pages devoted to the Hohokam and Mogollon are concerned with the cultural background while the pottery section gives the reader very little detail. The bibliography for this section lists one popular book on the Southwest but none of the very important ceramic summaries or the many technical papers. Though the Central and South American sections have a somewhat more detailed coverage, there are numerous factual errors. However, inasmuch as this book is one of a series not meant for the professional, but rather for the interested layman, perhaps these points of restricted and disproportionate coverage and occasional factual error should not be taken too seriously. We might hope that in future numbers of this series other areas of aboriginal New World ceramics might be considered and perhaps those covered in this volume given more detailed attention.

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The Midland Discovery. A Report on the Pleistocene Human Remains from Midland, Texas. FRED WENDORF, ALEX D. KRIEGER, AND CLAUDE C. ALBRITTON. Description of the Skull by T. D. STEWART. University of Texas Press, in cooperation with the Museum of New Mexico, Austin, 1955. viii+139 pp., 36 figs., 7 tables, 7 appendices. $3.50.

The Midland Discovery is a collection of fragmentary human bones and stone artifacts from the Scharbauer site near Midland, Texas. Special interest is aroused by the possible antiquity of the human fossils. This book assembles evidence collected at the site up to August, 1955, and presents an interpretation. The book is loosely organized; important data and arguments are scattered through an uneven text. Nevertheless, both fact and inference are there. Their importance repays the attentive reader.

The Scharbauer site is a group of blowouts in an old dune field. Older, reddish brown dune sand (Judkins formation) and younger, light colored dune sand (Monahans formation) were described some time ago in the Sand Hills, 50 miles to the southwest (Huffington and Albritton, 1941, "Quaternary Sand on the Southern High Plains of Western Texas," *Am. Jour. of Sci.*, Vol. 239, pp. 325-38). The same formations are identified at the Scharbauer site. The fragments of human bone, however, occurred in gray-white, calcareous sands (Units 1 and 2) exposed in a single blowout cutting through the typical Judkins formation (Unit 3). A single sounding shows that reddish sand underlies, as well as overlies, the lighter colored sands. Thus, Units 1 and 2 are probably interbedded with, rather than older than, the Judkins formation. However, available natural and artificial exposures have not provided a complete stratigraphy. Vertebrate fossils, including several extinct species, and uncharacteristic stone artifacts occur in Units 1, 2, and 3. Chemical analyses show that, in degree of mineralization, the human bones are properly compared to other bones from the Judkins formation. In view of the common difficulities of fixing stratigraphic position in blowout sites, this confirmation of the presumed antiquity of the human remains provides necessary reassurance. Additional stone artifacts are younger than the human bones. They are ascribed to an old land surface, separating Judkins and Monahans formations. These artifacts, and their assigned stratigraphic position are important to subsequent arguments on the age of the deposits.

Artifacts are moderately abundant in numerous blowouts cutting through the Monahans formation. The blowouts are floored by an irregular surface on the moderately indurated Judkins formation, essentially a stripped unconformity. The numerous blowouts which do not cut through the Monahans formation appear to be barren of artifacts. In the single blowout which exposes calcareous sands underlying the Judkins formation, the stone artifacts are of types identical to those found elsewhere. Hence, the majority of the artifacts are certainly younger than the Judkins formation. Furthermore, all of the artifacts may be older than the Monahans formation.

The assemblage described includes projectile points ordinarily regarded as paleo-Indian (including 7 Folsom points), and stemmed points ordinarily regarded as substantially younger. One may infer that the stabilized surface of the Judkins formation was exposed for a long interval of time, during which a succession of cultures passed through the area, before the Monahans formation began to accumulate. The inference, reasonable but not inescapable, is never clearly adopted or rejected by the authors. Rather, one gathers that admixture of Folsom and some "younger" cultures is accepted. Other projectile points, characteristically late Indian, are apparently regarded as fortuitous and ignored in later discussion.

Antiquity of the human remains can be estimated by radiocarbon dating, by geologic inference, or by archaeologic inference. At present, the 3 lines of argument do not yield identical results. It is therefore desirable to consider them independently. Radiocarbon ages were determined on composite samples of bone from Unit 1 (M-389, M-390, and M-391 combined: 8670 years) and from Unit 2 (M-411: 7100 years). The available amount of carbon was small, and the results of analysis are therefore open to question. In fact, the determined age of sample M-411 was increased more than 2000 years by extending the time of measurement from the conventional 48 hours to a fortnight. Uncertainty necessarily exists, but the indicated age of the human fossils from Unit 2 is about 7100 years (early Altithermal).

The Judkins formation is part of the oldest, widespread blanket of sand with recognizably preserved dune form on the High Plains surface (Series III of Melton, 1940. "A Tentative Classification of Sand Dunes, its Application to Dune History in the Southern High Plains," *Jour. of Geology*, Vol. 48, pp. 113-74). Melton originally suggested that this unit antedated the last pluvial maximum of eastern New Mexico. Most others have inferred that the Judkins and related formations with recognizable dune form are postpluvial. The greatest accumulation of dune sand, including the Judkins formation, is ascribed to the presumably greatest interval of aridity, the Altithermal. Such an age may be entirely consistent with the radiocarbon dates obtained at the Scharbauer site. Inconsistency arises if Units 1 and 2 are interbedded with, rather than older than, the Judkins formation. Not only are the radiocarbon dates somewhat too old, but the moist, lacustrine environment recorded by at least Unit 1 is inconsistent with the maximum aridity invoked to explain the widespread movement of sand.

The several extinct vertebrates recorded in Units 1, 2, and 3 are characteristic of late Pleistocene deposits in the Cordilleran region. Their extinction is certainly postpluvial; at least their local disappearance is commonly ascribed to the Altithermal. Their local occurrence, therefore, implies that the Judkins formation may antedate the Altithermal.

The evidence of stone artifacts is clearly contradictory. Folsom points, in particular, are commonly ascribed to a hunting culture only slightly younger than a late Wisconsin glacial advance in the southern Rocky Mountains. At the Scharbauer site, Folsom and related types certainly appear to be younger than the Judkins formation. However, projectile points characteristic of Plains cultures postdating the Altithermal are found in the same general context. Thus, archaeologic inference implies that (1) the Judkins formation antedates, rather than records, the Altithermal, and that (2) dune sand was stabilized during a long, presumably moist, interval throughout the Altithermal, so that artifacts dropped by paleo-Indian (pre-Altithermal) and Indian (post-Altithermal) hunters came to lie side by side on the same surface. Alternatively, Folsom and related hunting cultures persisted throughout the Altithermal and occupied the Midland area during the beginning of a subsequent interval of relative moisture. Either alternative does violence to present working hypotheses.

The authors of the Midland Discovery discount local radiocarbon dates, the generally accepted age of the Judkins formation, and the apparent association of paleo-Indian and Indian projectile points in one context. Rather, they rely upon the generally accepted age of Folsom culture as principal horizon marker in the local history. They thus revive (but do not cite) Melton's suggestion that a major interval of dune formation on the southern High Plains preceded the "last" pluvial maximum. The human fossils would thereby rank with the oldest documented remains from North America.

The difficult assumption that paleo-Indian techniques, including Folsom, did locally survive the Altithermal permits less violation of present hypotheses. Human and extinct vertebrate fossils would date from an interval transitional to the Altithermal, and to the principal accumulation of the Judkins formation. The local radiocarbon dates would give fair approximations of their age. A curious mixture of paleo-Indian and Indian projectile points would have accumulated on a surface stabilized by vegetation during the moist interval following the Altithermal.

One can only conclude that the questions raised at Midland should give new impetus to students of the late Pleistocene history of the southern High Plains.

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The Arctic Woodland Culture of the Kobuk River. J. L. GIDDINGS, JR. Museum Monographs, University Museum, University of Pennsylvania, Philadelphia, 1952. ix + 143 pp., 43 figs., 46 pls. $2.50.

Giddings' monograph is of major importance for several reasons. It records the first large scale excavations in any inland Arctic area and the first treering chronology for the Arctic. It presents an exemplary linkage of the archaeological past with the ethnographic present, and it advances a new concept for Arctic anthropology, that of an independent cultural entity called the "Arctic Woodland Culture," which the author believes must be considered "in terms of neither Eskimo nor Athapaskan patterns, but of a third, and possibly older, combination of culture elements." In addition, the method chosen for describing and interpreting the sites and materials is the most successful of any heretofore attempted for the Arctic and might well serve as a model for presenting the results of any multiple site investigation.

A few laconic sentences in the introduction tell of exploits rarely performed by a field archaeologist. Arriving at Alatna (Allakakat) on the Koyukuk River by airplane in mid-July 1940, Giddings set out alone on foot across unmapped territory toward the headwaters of the Kobuk. Six days or more later he reached the river, built a raft, and drifted 60 miles downstream where he encountered the first people, the Shungnak Eskimos. The rest of the summer was spent locating and testing old sites between Shungnak and the coast, recording ethnographic data and collecting core samples from living trees as basis for a treering chronology. The next summer 25 house ruins were excavated; these yielded several thousand specimens as well as treering material sufficient for dating four of the major sites. In 1942 Giddings had an opportunity to observe the winter side of Eskimo life when, on an Army mission, he traversed almost the entire Kobuk River on snowshoes and by dog team. At the end of the third season's work, in 1947, a large body of ethnographic data had been collected, almost 80 houses had been excavated, and the 5 major sites had been fitted into a treering chronology extending from A.D. 970 to the present.

The topical-geographical arrangement of the descriptive sections is one that avoids duplication and yet facilitates site by site and period by period comparisons. This is accomplished, in Part II, by describing the sites and materials under 11 aspects of culture: villages and houses, fishing, land hunting, sea hunting, travel and transportation, tools and manufactures, skin working and tailoring, food preparation, personal adornment, communal activity, and clay working. Each of these sections follows an identical pattern, one that begins with the present, goes backward in time from the youngest to the oldest site, and ends with a comparative analysis and interpretation. As an example, under fishing we find first a summarized account of fishing methods practiced by the Kobuk Eskimos in historic times. This is followed by a description of the fishing artifacts excavated at Ambler Island on the upper river (A.D. 1730-1760), at Intermediate Kotzebue on the lower river (A.D. 1550), Old Kotzebue, lower river (A.D. 1400), Ekseavik on the middle river (A.D. 1400), and Ahteut, middle river (A.D. 1250). In the analysis which follows, changes in artifacts and techniques are described, Kobuk fishing economy of the different periods is reconstructed, the artifacts are compared with those of other Eskimo cultures, and wherever possible interpreted in terms of relationships and origins.

Treering dating is described in Part III and the summary and conclusions are given in Part IV. Supplementary excavations at other Kobuk sites and unclassified materials are described in 2 appendices. A third lists the number of implements of each type found at the various sites and tabulates them according to materials.

The oldest site, Ahteut (A.D. 1250), was a large village of about 100 houses midway up the Kobuk 100 miles from the sea. Ahteut houses varied considerably in structural detail though the general form was the same —semisubterranean, square to rectangular with a long deep entrance tunnel, wooden construction, 4 central roof supports, side benches, and a fireplace either at the center or in front of the entrance. These were the deepest of any of the Kobuk houses, with floors sunk to a depth of 3 to 5 feet. The entrance passages were from 6 to 29 feet long and usually 1½ feet deeper than the house floors. This is essentially the house type of the Western Eskimo and Tena. In sinking their houses to such a depth and in providing them with such long deep entrance tunnels, the Ahteut people were continuing in an inland environment a coastal tradition followed by some Eskimo groups from the earliest known times to the present. On the Kobuk, however, the practice was discontinued gradually after the time of Ahteut, as the house floor became shallower and the long entrance passage became vestigial.

Other changes in time are described. Villages became smaller and nomadism increased with the advent of dog traction after 1400. Fish hooks and lures, harpoon heads, arrowheads and points, pottery vessels, and possibly needle cases changed in form, in much the same way as among coastal Eskimos. Plate armor appeared after 1400 and labrets after 1500. Paddle and textile impressed pottery, abundant at Ahteut, diminished after 1400 and disappeared after 1500. Cutting tools of rubbed slate, which were prevalent at Ahteut, decreased in importance after 1400. The use of jade increased rapidly after that date and on the upper river had completely replaced slate by the early 1700's.

In addition to house types there are numerous other strong connections between Ahteut and coastal Eskimo, which to the reviewer clearly identify this inland manifestation as Eskimo. Eskimo elements, in fact, constitute the bulk of the specific features that identify Ahteut culture. The only traits, in the reviewer's opinion, which are not specifically Eskimo are the *tci-tho* disc-shaped

stone scraper and the splitting adz, though even these are present at Ipiutak and Kachemak Bay, respectively.

The material from the later Kobuk sites included many of the traits present in Ahteut, and in addition a number of other specific Eskimo elements. The fact that these constitute the greater part of Kobuk culture, is the basis for my questioning Giddings' conclusion that the culture is neither Eskimo nor Indian, but an independent entity separate in origin from coastal Eskimo. Nor is it easy to reconcile this preponderance of coastal Eskimo elements in an inland setting with the statement that, "The evidence at hand indicates no cultural division of Kobuk people in times past that cannot be explained on a purely geographical and environmental basis" (p. 113). Indeed, it would seem that a better case could be made for the opposite view — that the primary explanation is cultural, that close communication and contacts maintained continuously between the coast and river people resulted in a parallel development of culture in both areas from the time of Ahteut to the present, and that Ahteut itself was an inland extension of a long-established coastal pattern.

Giddings of course recognizes the Eskimo character of the material he excavated on the Kobuk, not only throughout the descriptive and comparative sections of the book, but in the explicit statement that, "With the exception of certain jade products, and a few other objects not yet identified, almost nothing exists in the materials recovered from Kobuk sites that cannot be readily understood in terms of comparatives from Alaskan sites of the present or past" (p. 116). Nevertheless, the Kobuk culture is explained, or typed, not on the basis of its preponderant Eskimo content, but in terms of "emphases and groupings of elements" that are considered to be distinct from those of coastal Eskimo. Eleven combinations of traits and practices that "set this culture apart from most others" are listed on page 116. Of these, jade working was undoubtedly a Kobuk invention, or should we say, an adaptation by these Eskimos of a newly found local material which they began to use after A.D. 1400 in place of rubbed slate. Similarly, the chipped stone implements of the Kobuk people, like those of the north Alaskan Eskimos generally, may well have been derived originally from an inland source, some undiscovered stage of culture intermediate in time between the very early Anaktuvuk Pass complex and Ahteut. However, when we examine the specific elements that are supposed to characterize the Arctic Woodland Culture we see that most of them — the house with 4-post central construction, pottery with textile and Birnirk curvilinear stamp decoration, fish nets, sinkers, the leister and fish spear, fish-shaped lure, gorge, ice pick, and snowshoes — are not restricted to the Kobuk but occur at many coastal Eskimo sites, some older than Ahteut, so that their inland Kobuk origin would seem doubtful. The extensive use of antler, spruce, birch, and willow, and dependence on fish as the principal source of food, would naturally be expected of any people living in a river-forest environment. Most of the other traits listed as constituting the core of the Kobuk culture, such as the tci-tho scraper, beaver tooth knife, stone pick and ax, and splitting adze, if not actually of Indian origin, are at any rate few in number and unimpressive as compared with the many more typical Eskimo traits with which they were associated.

If the Kobuk People had not been successful in exploiting the 2 principal food resources available to them — fish and caribou — they could not have lived there. That they were successful in this respect is evidence of a close adaptation to their environment, as Giddings has emphasized, an adaptation which, however, would seem inevitable rather than remarkable. The environment would require that they live by caribou hunting and fishing. It would not, however, dictate the particular *forms* of their hunting and fishing implements, and when we see that most of these, like most of their other implements, were identical with types used on the coast, and that these types in turn can be traced to earlier coastal horizons, it seems to me that we have clear evidence of the coastal, Eskimo origin of the Kobuk people.

Some of Giddings' other major conclusions which I would question can only be mentioned here: (1) the reason given for excluding the Kobuk culture from the Eskimo continuum, namely that *all* of its individual traits and combinations do not occur in earlier phases of Eskimo culture (p. 115), an explanation that tends to ignore the role of invention, local adaptation, and accretion in the normal process of culture growth; (2) bringing the Arctic Woodland Culture into relationship with the Ipiutak "Palae-Eskimo" complex because it "has more of its distinctive combinations in common with Palae-Eskimo than with Neo-Eskimo culture" (p. 117), though only 3 such combinations are mentioned (preference for antler as material for weapons and tools, high development of flint work, and possibly stone boiling), whereas the great bulk of the culture must be equated with Thule-Punuk, which is "Neo-Eskimo"; (3) expanding the particular traits and combinations of Kobuk culture into a universal concept, the Arctic Woodland Culture, which may be expected to have existed in any Arctic region where similar environmental conditions prevailed, a prediction that ignores the high probability that, while the basic economy in any such area would of necessity be one of hunting and fishing, the specific techniques and elements employed therein would be historically and culturally determined, varying regionally according to local practices and established culture patterns.

While one may differ with Giddings' interpretations and conclusions, the work as a whole must be recognized as one of high merit, one that will stand as a major contribution to Eskimo archaeology. Divested of its theoretical superstructure, it is the finest example in Arctic literature of the linkage of past and present, a

remarkably lucid, logical, and complete exposition of the gradually changing material culture of a segment of the Eskimo population that had adapted itself to a complex environment of sea coast, mountains, and forested streams.

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Chugach Prehistory: The Archaeology of Prince William Sound, Alaska. FREDERICA DE LAGUNA. University of Washington Publications in Anthropology, Vol. 13, University of Washington Press, Seattle, 1956. xix+ 289 pp., 37 figs., 59 pls., 7 maps. $6.50.

The 4 summer field seasons, 1930-1933, that de Laguna spent in the Cook Inlet and Prince William Sound region of Alaska, making anthropological studies, produced the first series of systematic archaeological studies along the Pacific coast of Alaska. In recent years the only other excavations in this large area have been at Katmai National Monument, Angoon, and Yakutat. De Laguna's sustained interest in the archaeology and ethnography of Alaska's north Pacific coast has resulted in the publication of 3 major monographs, of which *Chugach Prehistory* is the most recent.

This volume details the results of an archaeological survey of Prince William Sound on the western quarter of the Gulf of Alaska. The sound itself is characterized by fiords, receding valley glaciers, numerous islands, and generally rugged rocky terrain with dense spruce and hemlock forests on the islands and mainland. There are over 2000 miles of coastline in the sound if the islands are included. Many sectors were visited in locating sites but other large areas were not covered. Most of the 67 sites reported were visited by de Laguna, but only at Palugvik and the Palutat cave were there detailed excavations.

The Palugvik site on Hawkins Island consists of a small shallow east midden and a larger west midden, which is as much as 8 feet thick; from the entire site some 1100 specimens were recovered. Palutat cave, on the north central sector of the sound, had long been known to contain burials and had been plundered rather thoroughly prior to de Laguna's visit. However, 10 burials and some 280 artifacts were found. The cave finds seem to extend back in time before the earliest Palugvik material, and trade beads represent contacts more recent than those at Palugvik; however, the comparisons are based on comparatively few artifacts. Remains from the sampled sites include planing and splitting adzes, stone chisels, slate plaques, awl-like lance points, straight and curved ulu blades, and long double-edged blades, all indicating a well-developed slate industry. Pecked stone work includes lamps and hammerstones; chipped artifacts are scarce but include scrapers, ulu blades, and a few end blades. Bone work is represented by harpoon dart heads, socket pieces, needles, a variety of awls, ornaments, and bladed tools. Shell work consists mostly of beads and pendants. A very good ethnographic description of many of the artifact types recovered may be found in *The Chugach Eskimo* by Birket-Smith. Since he considers the possible time depth for the various cultural elements, his monograph provides useful comparative material for de Laguna's archaeology.

In concluding, de Laguna considers the Prince William Sound finds as representing much of Chugach Eskimo material culture for the 500 years preceding historic contact. The people were primarily sea mammal hunters with well-developed wood working techniques. Their technology changed very little during the period for which we have an archaeological record. The cultural connections are closest with Cook Inlet, then farther afield with Kodiak Island, the Alaska Peninsula, and the Aleutians. "Prince William Sound represents one of the cultural subareas of the Pacific Eskimo-Aleut province." The way of life of the people is described as distinctive, and "it was not simply a northern culture transplanted to the sub-arctic, but had its own roots and history."

The arrangement of this monograph is good and it is well illustrated. There are detailed maps of the various areas in which sites were found and a good map of the sound as well. Unfortunately, there is no map which places Prince William Sound in relation to the surrounding areas, which are often referred to in the text.

Currently there is a revival of interest in the archaeology of the north Pacific region. The Aleutian Island researches of Jochelson and Hrdlička are being supplanted by those of Bank, Laughlin, and Quimby; a recently published monograph by Heizer on one of Hrdlička's major excavations on Kodiak Island offers the first systematic report on the archaeology for this rich area. Interest in the general region has been sparked partially by Laughlin's recovery of Aleut artifacts from Umnak Island, with associated hearth material "dating" around 1000 B.C. by radiocarbon techniques (however, de Laguna would question the suggested age). Interest also has been stimulated by Borden's finds in British Columbia of ground slate tools which are technologically similar to certain western Eskimo artifacts. *Chugach Prehistory* is certainly a timely contribution for a strategic area, and de Laguna's attempt to link prehistoric archaeological findings with historical accounts and informants' statements is a valuable approach to prehistory. It seems strange however, that early historic sites were reported but none were excavated so that such problems as that of the Chugach Eskimo house type could be solved. Finally, and unfortunately, an inescapable conclusion concerning this monograph is that the material which was recovered does not merit the extensive repetitious analysis which it is given; much too much has been said about too little.

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Archaeology of the Uyak Site, Kodiak Island, Alaska. ROBERT F. HEIZER. Anthropological Records, Vol. 17, No. 1, University of California Press, Berkeley and Los Angeles, 1956. vi+199 pp., 63 figs., 85 pls., appendix. $3.00.

From 1931 to 1936, the late Ales Hrdlička of the U.S. National Museum excavated an important site at Uyak Bay on the west coast of Kodiak Island. The author of this report was one of his assistants during the last 2 seasons. Hrdlička was not really an archaeologist, and while he secured many skeletons and a great collection of artifacts, he kept no adequate records of his finds. He ignored stratigraphy, made no sketches of burials or house remains, and simply undercut the exposed face of the midden to secure specimens most easily. This great site, which might have solved problems of changing cultural traditions and of population types on Kodiak Island, was thus virtually destroyed.

To be sure, he marked artifacts with colored pencil to indicate from what level of the midden they presumably came: black for "Koniag or Upper Layer," red for "Later Pre-Koniag or Intermediate Layer," and blue for "Oldest Pre-Koniag or Deep Layer." These designations would have been valuable if Hrdlička had based them on the stratigraphy of the site, so obvious from published photographs, but they were apparently based on impressions, and the proveniences of a number of pieces are even more dubious since these bear marks in 2 colors.

Heizer has prepared an excellent report, dealing fairly with this material, so rich in quantity, variety, and excellence of manufacture, and so deficient in documentation. He has described the artifacts fully, and the illustrations are of the highest quality, although the trait tables are difficult to follow until one has memorized Heizer's typology. In most cases he has been forced to lump together Hrdlička's 2 "Pre-Koniag" layers as Lower Levels, keeping apart only the smaller collection from the Upper Lever ("Koniag"). He cautions that we cannot assume, as Hrdlička did, that the latter marks a period when an earlier population was abruptly replaced by another, or that there was a striking transformation of culture. Most valuable, of course, is the information about houses, hearths, and burials which Heizer himself observed and recorded.

He presents a very thoughtful summary of the cultural position of the Pacific Eskimo and of the chronological problems in this area. The Uyak site has obviously had a long history, "extending perhaps over two or three millennia" (p. 10). The chronological relationships to the Uyak sequence of features characteristic of other Kodiak sites are suggested. Heizer equates the Lower Levels of Uyak with Kachemak Bay I and II of Cook Inlet, and the Upper Level with Kachemak Bay III, although noting that there are no exact trait-by-trait correspondences. I find it difficult to accept this correlation. There seems to be no stage represented at Uyak which corresponds to Kachemak Bay I with the latter's open-socketed harpoon heads; in fact, Heizer describes no specimens of this primitive type. On the other hand, abundant burned stones, probably used in the steam bath, are characteristics of the Upper Level, and pottery at another site on Kodiak he feels is contemporaneous. This suggests that the Upper Level at Uyak should be correlated with the last period on Cook Inlet (Yukon Island IV and the Indian instrusion) which were characterized by evidence for the steam bath, pottery, and native copper. Furthermore, Kachemak Bay II, sub-III, and the long Period III all seem to correspond well typologically with the material from the Lower Levels at Uyak. The guess dates which I originally assigned to the Cook Inlet sequence now appear to have been erroneously conservative and have probably created difficulties in cross dating. Furthermore, as Heizer points out, the oldest material from Cook Inlet is really very scanty.

Although it is a minor point, I should like to correct Heizer's summary (p. 56) of the evolution of the socket piece on Cook Inlet, which appears to have been from shorter towards longer and more slender forms and from ones made in 2 parts to a one-piece type, although several varieties were used in the Third Period.

We should all be very grateful to Heizer for making available to us this rich material and for extracting scientific value from such incomplete and confusing data. Unfortunately the unravelling of the complex cultural sequence on Kodiak Island must depend, as he has said, upon careful excavations at other sites.

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Tagodai Iseki (Tagodai Site. Relics of Yayoi Period at Tagodai, Katsuyama, Chiba Prefecture). Waseda University Archaeological Institute and Chiba Prefecture Board of Education, Waseda University Press, Chiba. (Distributed by Cultural Properties Protection Commission, Ministry of Education, Tokyo.) 116 pp., 22 figs., 54 pls.

This report, in English and Japanese, is important for its illustrations of the restoration of a protohistoric pit house. The site is that of a community of agriculturists, relying on tools and weapons of stone, though with some contact with peoples using bronze, iron, and glass. The occupants of the site were indisputably ancestors of the present Japanese, and the site should be dated to about A.D. 200. This period is termed "Yayoi" and is usually equated with a "Bronze Age." The excavators completely uncovered 2 oval pits of similar shape and size, each of which showed postmold patterns indicating the type of roof supports. One house had burned, but the charred logs on the floor showed the orientation of the structural members. Complete restoration of the house was based on these data.

Four uprights were placed in the ancient postmolds, and across these were placed 4 lintels forming a rectangle. Against this, 6 stout poles were leaned — two on

each side and one centered on each end lintel. Three of these poles were tied together at the juncture, forming 2 opposing tripods which enclosed each end. In the forks of the tripods was laid a ridgepole as long as the house pit. Against this framework were placed closely-spaced poles somewhat smaller than the main members. These formed 2 tiers, one from ground level to the lintel, and a second from the lintel to the ridgepole. Straw rope was used to tie the logs at all points where they intersected. Additional ropes were laced between the poles, and this surface was then completely covered with layers of straw thatch. A door of small poles was framed at ground level. No windows were provided, but a smokehole was left under the ridge at each end. Earth banked against the inside of the inclined poles prevented the entrance of surface water.

Similar reconstructions of early dwellings have been made at other sites in Japan. The effort and cost expended in this work are tributes to the almost universal interest of the Japanese in their history and antecedents. Many architectural features of the Yayoi Period houses are still found in Japan, notably in religious structures, such as the Grand Shrine at Ise. The authenticity of the reconstruction at Tagodai can, therefore, be demonstrated both by inference and by example. The meticulous care and attention to detail evidenced by the exploration at Tagodai is commendable. The restoration of the pit house illustrates what might likewise be done at other sites yielding comparable data, including pit dwellings of American Indians.

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Paa-ko. Archaeological Chronicle of an Indian Village in North Central New Mexico. MARJORIE F. LAMBERT. *The Physical Type of the Paa-ko Population.* SPENCER L. ROGERS (bound separately as Part 6). School of American Research, Monograph 19, Santa Fe, 1954. Parts 1-5: xv+183 pp., 54 figs., 39 pls., 13 tables. $6.00. Part 6: iii+48 pp., 65 illus., 32 tables. $3.00.

The problem of excavated but unpublished sites is a serious one in American archaeology. Field work, regardless of how early it was conducted, is generally not wasted effort and the results are worth publishing. The excavation of Paa-ko was carried out in 1935-37 but the information is timely in view of the lack of knowledge of the region east of the Rio Grande. The School of American Research is to be commended for the present policy of publication of older materials.

Paa-ko is a late prehistoric to early historic pueblo in the foothills east of the Sandia Mountains and on the edge of the Galisteo Basin. It is a divided pueblo with 2 major parts, a small southern unit and a much larger northern one. Both units of the pueblo were constructed toward the close of the 13th century and were abandoned about 1425. A second occupation took place in the north unit in the 16th century and the pueblo was finally abandoned sometime between 1626 and 1680. The site was first studied by Nelson in 1914-15, who conducted excavations in both units. The University of New Mexico conducted student field sesssions in 1949-50 but that work has not yet been published. It is regretable that Lambert did not summarize the results of the 1949-50 seasons. The monograph is based almost entirely on the 2 seasons work in 1935-37. Lambert supervised the second season and so was spared the task of writing from someone else's field notes.

The monograph is in 2 volumes; the first, in 5 parts, covers the cultural remains, the second, Part VI, is a physical anthropological study of the Paa-ko population. Part I is a medley of short sections on the physical setting, a condensed acccount of the geology of the Sandia Mountains, the historical background, and a summary of Bandelier's research in which he dates the final abandonment of the site.

The second part is a description of the site and of the architectural details uncovered by excavation. An account of Nelson's work at the site is included. On one page Nelson's work is referred to as "extensive spot testing in both divisions" and on the next page this spot testing is found to be 75 rooms in the south division. Twelve pages later it is stated that "Nelson also carried on spot testing in this (the north) portion of the site," but, if my addition is correct, 97 north portion rooms were dug by Nelson. This point is made because Part II contains a large number of tables which are not brought together. Despite this criticism, Part II contains an enormous amount of information about the architecture of Paa-ko.

Over half of Part III, Material Culture, is devoted to extensive discussion of Paa-ko ceramics. The section is well-handled with numerous tables of sherd counts and a large number of excellent photographs, design drawings, and rim profiles. Utility wares receive greater attention than is normally the case in southwestern archaeological reports. Other items of material culture are adequately described. It is a pleasure to read that the Paa-ko people used random stones as tools and that they were human enough to collect curiously-shaped stones.

Snub-nosed scrapers and beveled knives in the prehistoric levels suggest some contact with the Plains and the author suggests that Plains tribes may have caused the first abandonment of the pueblo. Also found in the pre-Columbian materials were clay elbow pipes and miniature vessels, both of which are found in the Plains. Lambert in both this and another publication prefers to believe that the clay elbow pipes are indigenous to the Southwest. I believe that the elbow pipes, snub-nosed scrapers, and beveled knives are all of Plains origin. Kidder originally suggested that the elbow pipes from Pecos were of eastern origin and the continuous distribution from the High Plains to the Atlantic Seaboard tends to substantiate his belief.

Mortuary practices are discussed in Part IV. The 146 prehistoric and 15 historic interments made possible the study of the Paa-ko physical type by Spencer L. Rogers in Part VI. The usual observations and measurements are listed in text and tables. It is gratifying that the skeletal

material has been subjected to study even though most of the work deals with the crania. This report takes its place with a bare handful of others dealing with the physical type of southwestern Indians. Comparison with Hooton's Pecos series indicates that "the peoples of Paa-ko and Pecos, as far as their respective samples indicate, were genetically a part of the same ethnic subcomponent of Southwestern population."

Part V contains the discussion and the conclusions reached. The troublesome problem of causes for the abandonment of prehistoric pueblos is treated in some detail. Lambert feels that the cause of withdrawal and consolidation was the knowledge that enemies were in the region but not necessarily in the locality of Paa-ko. In discussing the historic settlement of Paa-ko she suggests that the absence of European materials from the excavation is due to the fact that the people took these valued items with them. Lambert tends to follow Reed's conclusions in regard to the peopling of the Upper Rio Grande area from Mesa Verde, the identification of the Paa-ko people as Tewa speakers, and the strong impulses from the Western Pueblo region.

It seems that no archaeological report is complete without a list of suggestions for future research and this one is no exception. Lambert has raised a number of interesting questions which she cannot answer and all of them have merit. One interesting problem area concerns the connections between the Plains and Southwest. Krieger's work has indicated these connections and amplification of his approach and findings would be profitable. Lambert closes with a plea for more research toward this end in the northern Rio Grande area and so do I.

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Crooked Ridge Village (Arizona W: 10: 15). JOE BEN WHEAT. University of Arizona Bulletin, Vol. 25, No. 3, Social Science Bulletin, No. 24, University of Arizona Press, Tucson, 1954. 183 pp., 62 figs., 15 pls. $1.00.

It is only 2 decades since Haury's proposal that the Mogollon is a distinctive Southwestern cultural configuration challenged the hitherto generally accepted thesis of a single cultural pattern for the Pueblo Southwest. Because of the controversy and interest which developed over this "Mogollon problem," the central Mogollon region of eastern Arizona and western New Mexico became the scene of numerous archaeological investigations, and it is now one of the best-known regions in the Southwest. *Crooked Ridge Village* is a descriptive account of the excavation of an early Mogollon pit-house village located near Point of Pines in east central Arizona. The report, together with Wheat's *Mogollon Culture Prior to* A.D. *1000* was submitted as a doctoral dissertation at the University of Arizona. Of the many excavation reports which have appeared on Mogollon archaeology, *Crooked Ridge Village* is perhaps the best.

In all, 22 domestic structures, 2 ceremonial houses, and a one-room late Pueblo unit were cleared. The excavated houses are only a fraction of the total village. Wheat concentrated his efforts in 2 widely separated areas within the site. All of the domestic houses are relatively shallow and most of them are rectangular in outline. There are 3 main types classified by kind of entrance: ramp, vestibule, and southern annex. Pottery analysis indicates that the annex houses are slightly later than the other varieties. The ceremonial rooms are considerably larger and are distinguished by grooves in the floor which outline a rectangular area around the hearth. Wheat presents a lucid account of the techniques which may have been employed in roofing the houses and a convincing description of the original appearance of them.

Wheat makes an excellent point regarding recent suggestions that handicrafts be described in functional or cultural contexts. Although his classification is of the standard type based on material he notes that his categories are also functional ". . . because the processes involved in the making of tools and utensils are, for the most part, the application of technological skills culturally inherited." The pottery from Crooked Ridge Village is preponderantly a plain brown ware which Wheat classifies as several varieties of Alma Plain. Decorated pottery includes a rare unnamed broad-line red-on-brown. Intrusive pottery consists of a few sherds from the Petrified Forest area, the Mimbres Branch, and the Hohokam. From all indications this highly important body of evidence is carefully handled and adequately presented. However, it is unfortunate that Wheat lists under intrusive pottery which he assigns to Anasazi origin such generally accepted Mogollon types as Three Circle Neck Banded, a brown paste corrugated, Tularosa Fillet Rim, and Gila Polychrome. In fact the only intrusive Anasazi types are Lino Gray and Kiatuthlanna Black-on-white. In the description of the remaining artifacts Wheat goes beyond the usual presentation of statistical data and includes not only the range in dimensions but mode as well.

Since there are no treering dates available for the occupation of Crooked Ridge Village, Wheat is forced to rely on ceramic evidence to date the site. He uses several techniques to seriate the houses, but the most convincing is based on the presence and absence of certain critical intrusive pottery types. Wheat concludes that the north end of the site was occupied somewhat earlier than the south end. He defines a single phase for the major occupation, but he divides it into early and late subphases. He assigns most of the houses to the early portion of what he has named the Circle Prairie phase (tentatively dated earlier than A.D. 400). At least 4 houses are believed to have been occupied during the late part of this phase (400-600). The San Francisco phase (600-900) and the Three Circle phase (900-1000) are represented by one house each. Appar-

ently the site was abandoned for a considerable interval after the Three Circle phase because the single room pueblo is attributed to the Point of Pines phase (1350-1450).

The concluding sections of the report are perhaps too brief, no doubt a result of dividing the original manuscript into 2 parts and publishing them separately. For this reason, the nonspecialist reader may have some difficulty in evaluating the significance of Crooked Ridge Village. This problem will certainly disappear if the report is used in conjunction with Wheat's synthesis of the Mogollon.

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Mogollon Culture Prior to A.D. *1000*. JOE BEN WHEAT. American Anthropological Association, Memoir 82, American Anthropologist, Vol. 57, No. 2, Pt. 3; and Memoirs of the Society for American Archaeology, No. 10, American Antiquity, Vol. 20, No. 4, Pt. 2, Menasha and Salt Lake City, 1955. xiii + 242 pp., 12 figs., 18 tables. $2.00.

This monograph will serve Southwesternists both as reference and source of problem for a considerable time to come. Wheat's report is a timely and eminently useful summation of the data which have been labeled Mogollon by some and attacked as "Mogollon" by others. In our race to dig and to accumulate archaeological fact, it is well every now and again to pause and take stock of the direction and distance we have already run. Wheat has done just this. It is hoped that the publication of this work and of such others as Colton's *Sinagua* and Wormington's *Fremont* will induce the specialists to provide similarly for other cultural and geographic units of the Southwest.

Wheat presents his material in 2 major parts. The first is a recitation of the empirical data including the geography of the Mogollon area, the taxonomy of the Mogollon, a summary of the excavated sites, and a detailed view of village pattern, architecture, burial practices, ceramics, minor handicrafts, subsistence, social organization, and over-all cultural pattern. The second is an analysis of the role of the Mogollon in Southwestern prehistory, including the chronological bases for comparison, the relation of the Mogollon to prepottery horizons, to the Hohokam, and to the Anasazi. Finally, Wheat presents some currently pressing problems along with his answers to them.

Wheat has gathered his facts with thoroughness and reported them conscientiously. However, he has been seriously handicapped in this task by the deficiencies of his sources, even the most recent of them. Time and time again he has been forced to omit, to make guesses, to extrapolate — even with regard to the most regularly reported categories such as house features, burial practices, ceramics, and chipped stone. It cannot be coincidental that both Wheat in this monograph and Woodbury in *Prehistoric Stone Implements of Northeastern Arizona* have found, in their attempts to make detailed comparative studies in the Southwest, that much of the archaeological literature is neither complete nor clear enough for sure comparison. As I have mentioned elsewhere, it seems that a strictly comparative approach, at least as it has been and is now practiced, is not sufficient even for comparative studies.

Certain inconsistencies reduce the effectiveness of these factual compilations. For example, there seems to be some confusion as to whether there are one or 2 taxonomic branches represented in Mogollon sites in western New Mexico. In the first 5 chapters, Wheat recognizes a single branch, the Mimbres — although he does say that it "may be further divided into 2 subareas." In the rest of the report, however, he assigns the material to either Mimbres branch or Pine Lawn Valley branch (although there are a few exceptions, for example, p. 187). This failure to reconcile the 2 segments of the monograph definitely affects the utility of the first 5 chapters. When an artifact is identified as belonging to the "Mimbres Branch," we cannot know whether it would be attributed, in the last chapters, to the Mimbres and the Pine Lawn Valley branches or just to one of these units.

For another example, it is quite impossible to be sure of the sizes and shapes intended by the outline drawings of pottery vessels in Figures 3, 4, and 5. The draftsmanship is so crude that one is not at all certain (in the absence of textual explanation) whether representations which look *more or less* alike are actually intended to be alike or different. Also the lack of concordance in the identifying letters and the scale of the several figures makes identification difficult if not impossible. For instance, Figure 9 *r* surely does not represent a Type 7 knife as the text says it does.

Wheat's assessment of the position of the Mogollon in relation to other cultural entities surrounding it in time and space are based largely upon current premises (in the making of which Wheat has had a not inconsiderable hand) and are, therefore, both significant and useful. His immediate personal contribution, particularly in regard to Mogollon-Anasazi relationships, is a most provocative series of hypotheses. He suggests that certain cultural traits were introduced to the Anasazi from the Mogollon during Basketmaker III and early Pueblo I times: "That these traits appeared at about the same time and were generally earlier in the southern Anasazi area suggests that they had a Mogollon origin." He finds this conception strengthened, first by the fact that most or all of the traits had undergone a long period of development among the Mogollon previous to their appearance among the Anasazi, and second by the fact that the traits apparently moved together. After about 700, and increasingly after 900, Anasazi traits began to move southward to the Mogollon.

Wheat concludes that, "while Hohokam and Mogollon were related in preceramic times [through Cochise] and mutually influenced each other in early pottery times, they pursued differing courses throughout most

of their history and thus represent separate cultural patterns. . . . Anasazi and Mogollon followed separate cultural developments, but with the Mogollon early influencing the Anasazi to bring about similarities deriving from somewhat different cultural bases. Later Anasazi influence on Mogollon again produced related cultural expressions, but throughout their histories each group maintained its own cultural integrity. . . . Each of these groups, and perhaps other groups not yet defined, underlying their mutual relationships, maintained a more or less functional unity apart from each of the others. To this extent, and no farther, they are basic cultures."

One word of wishing: that Wheat had not been content to accept the premises and conclusions of other workers and that he had examined explicitly and in detail the basic data and the premises of the taxonomic structure which includes both Mogollon and Cochise. In a work of such scope as this it seems fair to expect that the author will not be content with unexamined propositions but will review *all* the pertinent information and provide for his readers an explicitly reasoned opinion. Wheat does do this on a few but not many occasions. Particularly he fails to analyze the alleged identity of the nonceramic Pine Lawn-Tularosa Cave materials with the Cochise of southeastern Arizona. This is no place to go into the feeling of uneasiness which I have concerning this hypothesis. I do wish to say that the assurance with which it is viewed by a great many Southwesternists, apparently including Wheat, seems quite out of proportion to the quantity and quality of the evidence so far adduced in its support. The hypothesis may eventually turn out to be acceptable as presently stated, but it is my opinion that it is still very moot and deserves research attention, not unquestioning acceptance and continued unqualified assertion.

This same unwillingness to look evidence hard in the face seems to be at the bottom of Wheat's handling of Lehmer's hypothesis that the Hueco Cave Dwellers were Cochise and the cultural ancestors of the Jornada Branch of the Mogollon. Wheat says that he has "criticized" this hypothesis, but when we look at his discussion we can hardly call it a "criticism." It consists merely of unexplained and undeveloped implications from some very meager (distributional) data, 2 unsupported statements on origins and cultural differences, and a series of questions to which there are no answers at present because we do not "control sufficient data." That is all. Certainly Wheat's readers deserve better than that.

It is equally true that Wheat deserves better than to have this review end on a sour note. He has done a job for which all Southwestern and most American archaeologists can be grateful. If we had more such jobs, we would be much further on our way to an understanding of both culture and history in the Southwest.

WALTER W. TAYLOR
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Mohave Culture Items. LESLIE SPIER. Museum of Northern Arizona, Bulletin 28, Northern Arizona Society of Science and Art, Flagstaff, 1955. 35 pp., 3 figs., 1 pl. $1.00.

These cultural data, collected in 1931-32 "to fill some gaps in the published record" and to check points of comparison with other Yuman tribes, fall into 3 groups: material traits (fishing, hunting, traps, dress, utensils, weapons); warfare, comprising 2 war narratives; and calendar and time divisions. While all ethnographic data have potential value to the prehistorian, the archaeologist will find the discussion of a scissors trap of most specific interest. This trap has been identified archaeologically from Basketmaker sites in Utah and Nevada, including Lovelock Cave. The information on the Mohave calendar, not recorded previously, and the comparison of Southwestern calendars that follows, with an element distribution map, is a valuable contribution. Although the author refers to this publication as "brief notes" its clear organization and the skillful interpretations mark it as the work of one of our ablest ethnologists.

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Bonampak, Chiapas, Mexico. KARL RUPPERT, J. ERIC S. THOMPSON, AND TATIANA PROSKOURIAKOFF. Copies of the mural paintings by Antonio Tejeda F. and appendix by Rutherford J. Gettens. Carnegie Institution of Washington, Publication 602, Washington, 1955. xii+72 pp., frontis., 29 figs. (4 in color), 10 graphs. $3.00 paper; $3.75 cloth.

The discovery in 1946 of the mural paintings of Bonampak was one of the most extraordinary and most fortunate finds of American archaeology. The publication of this excellent monograph almost 10 years later demonstrates that Bonampak has lost none of its original importance. Although the mural paintings are now quite well known it is inevitable, as Pollock points out in the Foreword, that they "represent a storehouse of information that may be drawn upon for years to come."

The monograph is divided into 2 parts, the first dealing with architecture and sculpture, the second with the paintings. Thompson sketches the geographic setting, provides notes on the few known sites in the area, and summarizes the scant post-Spanish historical information on this inhospitable region which for centuries has been occupied only by the Lacandon Indians. Ruppert supplies important details on the location of the site, routes of access to it, and the history of its discovery. It is quite clear that the site itself was discovered by John Bourne and Carl Frey in February 1946, while the building with the mural paintings was first located by Giles Healey a few months later. Ruppert gives historical notes on the several expeditions to the site. The principal ones were cooperative ventures sponsored by the Carnegie Institution of Washington, the Instituto Nacional de Antropología e Historia of Mexico, and the

United Fruit Company. In another chapter Ruppert describes the architecture of Bonampak and compares it with that of nearby Yaxchilan. He sees many similarities between the 2 sites.

Proskouriakoff classifies the sculptural art of Bonampak into 2 groups: an older one which she assigns to the beginning of the Late Classic period, and a later one which she compares with the style of Yaxchilan at the end of the Late Classic. Her stylistic placement of the sculptures is in essential agreement with Thompson's reading of the hieroglyphic dates. He utilizes comparative material from other sites in reading the often badly weathered glyphs. He sees a considerable influence from Yaxchilan in the glyphic texts at Bonampak. Various similarities between the sculptured lintels of the Temple of the Paintings and the paintings themselves suggest to Thompson that the murals were painted at more or less the same time the building was dedicated.

Thompson and Proskouriakoff discuss the paintings in Part 2 of this study. Proskouriakoff writes on the artistic aspects of the paintings and compares them with mural paintings from other Mesoamerican sites. She emphasizes the basic difference between the realistic paintings of the Classic Maya style at Bonampak and the mythical symbolism of paintings at Teotihuacan, Monte Alban, Mitla, Santa Rita, and Tulum. She notes that the Classic realism is also distinct from that in the frescoes at Chichen Itzá. The Chichen Itzá paintings are realistic only to the extent necessary to make the historical events they record comprehensible. Also representative of the Classic style are the frescoes at Chacmultun and Uaxactun. Proskouriakoff points out that the Bonampak paintings differ from these earlier variants of the style in a shift from realism to naturalism. She notes strong influences from Yaxchilan in the paintings. She attempts to date the paintings by applying the method of dating which she set forth in her *Study of Classic Maya Sculpture*. Her conclusions are similar to those based on epigraphy. The Bonampak murals were painted toward the end of the Late Classic (about 9.19.0.0.0, or the beginning of the 9th century according to the Goodman-Martinez-Thompson correlation.

The longest chapter is Thompson's description and interpretation of the subject matter of the murals. He suggests that the paintings represent a drama in 4 acts of 7 scenes and a finale. The principal actors are a head chief (*halach uinic*) and his family and 3 lesser chiefs (*batabs*); a multitude of warriors, priests, dancers, musicians, servants, and prisoners make up the rest of the cast. The first act deals with the preparation for a dance. It is shown in 2 scenes on the walls of Room 1. The first shows the halach uinic surrounded by his family directing the final arrangements for the ceremony. In the second scene the orchestra has begun to play the overture while the dancers and the 3 batabs await their cues. The dancers wear masks representing aquatic animals which are symbolic of the earth; one of the masked dancers may be impersonating the youthful maize god.

The second act is painted on 3 walls of Room 2. Thompson believes that the title of Battle which has been applied to this act is an exaggerated one. He suggests that what is represented is more properly a raid against unarmed people who have been attacked by surprise, probably for the purpose of obtaining prisoners for sacrifice. The third act covers the north wall of Room 2. Thompson calls this act the Arraignment of the Prisoners preliminary to the grand ceremony. Seated before the halach uinic, his family, and the 3 high officials are a number of prisoners, two of whom have already been sacrificed. The others are terrorized and are either imploring the great chief or looking with horror at the drops of blood coming from their fingertips. Thompson bases his interpretation not only on specific details in the paintings but also on his extensive knowledge of Maya attitudes toward prisoners and sacrifice.

Thompson divides the third act (Room 3) into 3 scenes and a finale. The first scene shows the halach uinic dressed as a woman about to draw blood from his tongue. Thompson discusses the motives for the female attire. The second scene shows a group of minor officials in a conversation, and the third, a group of carriers with a god whom Thompson identifies as Mam, the god of earth, on their shoulders in a litter. The finale is a spectacular dance ritual performed by a group of dancers in elaborate or luxurious attire. A human sacrifice either has just been performed or takes place during the dance. Thompson also provides a study of the masks of deities which cover the upper part of the painted walls and the glyphs which record a poorly preserved text. He reads the text as 9.18.0.3.4. The glyphs shown in various parts of the murals are obviously related to personages and events.

In the final chapter, Thompson discusses various ethnological implications of the murals and provides interesting notes on such things as musical instruments, parasols or fans, clothing and personal ornaments, and weapons. In a brief summary, he emphasizes the importance of the discovery both as a work of art and as a valuable source of information in the life of the ancient Maya. In addition to the maps, and architectural drawings by Ruppert and Stromsvik there are photographs by Giles Healey and the magnificent water color reproduction of the murals themselves which were made to scale by Antonio Tejeda.

Together with the previous monograph by Villagra (*Bonampak, la Ciudad de los Muros Pintados*, Instituto Nacional de Antropología e Historia, Mexico, 1949), this study by Ruppert, Thompson, and Proskouriakoff makes available all of the research thus far carried out on the Bonampak paintings. Nevertheless, these 2 studies have in no way exhausted the rich potential of the paintings.

This book is a beautiful example of the book making art. It was one of the 22 selections by the Southern Books Competition, 1955, sponsored by the Southeastern Library Association. It is fortunate that the Carnegie Institution has provided a popular publication which

contains the reproductions of Tejeda's paintings along with an abstract of Thompson's interpretation, for distribution to the nonspecialist at a reasonable price (Carnegie Institution of Washington, Supplementary Publication 46, Washington, 1955, $1.75).

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A Chronological Ordering of the Mesoamerican Pre-Classic. JOHN L. SORENSON. Middle American Research Records, Vol. 2, No. 3, Preprinted from Publication 18, Middle American Research Institute, Tulane University, New Orleans, 1955. Pp. 41-70. 1 chart.

This paper is a welcome addition to the recent publications by Wauchope, Armillas, and Willey, dealing with the complicated cultural history of Mesoamerica. Sorenson has attempted successfully to establish a useful chronology on the basis of newer data and more elaborate trait comparisons. However he has confined his efforts solely to the Preclassic horizon and has not included data on Early Man or later periods. While the reviewer is well satisfied with Sorenson's chronological chart and site comparisons throughout Mesoamerica, he is not completely in agreement with his rigid separation of functional interpretation and chronological schemes. Much time and effort has been devoted in recent years to putting flesh on the chronological skeleton. If Sorenson had his way he would not only denude it but would rob it of all life and make it into a mechanical robot.

His suggestion that we adopt Petrie's sequence dating system "unconnected with cultural interpretation" is challenging. However, the reviewer is of the opinion that it is easier to refer to "the Urban Formative Period of the Guatemala Highlands" than to talk about "K75." It is hard to imagine that periods of man's cultural development can be expressed satisfactorily in terms of numerical formulas. Certainly great caution must be exercised in the choice of terms and they must be dynamic and flexible rather than static (such as "Archaic" or "Old Empire"). Furthermore the terms must derive directly from the cultural interpretations of the archaeological data. In this case there should be little objection to such broad designations as "Village Formative," "Temple Formative," "Urban Formative" or "Militaristic." A finer distinction can be achieved through the use of the terms "Early," "Middle," or "Late." As for specific phases within these broader designations there seems to be nothing safer than a noncommital name, preferably one that is not tongue twisting and can be easily spelled and pronounced. With the future refinements of radiocarbon dating it would certainly be undesirable to find such designations as K75*a*, *b*, *c*, and *d*. Neverthless, Sorenson has an important point which deserves further thought and greater care must be used in the future in labeling chronological periods than has been used in the past.

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Archaeological Reconnaissance in Central Guatemala. A. LEDYARD SMITH. Carnegie Institution of Washington, Publication 608, Washington, 1955. vii+87 pp., frontis., 140 figs., 2 tables. $3.85 paper; $4.35 cloth.

This volume records preliminary investigations at 67 Mayan archaeological sites in the highlands of Guatemala. The work was undertaken in order to obtain a general picture of ancient remains in the area and to determine the best locations for intensive excavations. One site, Nebaj, was investigated thoroughly and the results have been published separately (Smith and Kidder, 1951, *C.I.W., Pub.* 594). Inasmuch as the Carnegie program in Guatemala has been halted, this study, planned as preliminary, will probably remain the best general presentation of highland Maya architecture for a long time to come.

All remains of buildings surviving today are of masonry, which is of several types owing to the quality of stone locally available. Exterior surfaces were coated with lime plaster and paint. Most buildings stood on platforms or terraced pyramids. Walls of superstructures were of 3 types: those completely of perishable materials such as adobe or cane; those having the lower part of masonry and the upper part perishable; and those entirely of masonry. The corbeled masonry vault of the Maya lowlands is not found in the area investigated except in tombs. Beam holes indicated that some roofs were flat; others had sloping thatched roofs. The presence of twin temples on a single substructure suggests Mexican influences and the roofs probably were of Mexican type. The shape is known from early illustrations and pottery replicas but we have no details concerning materials and construction.

Archaeological settlements are of 3 distinct types. (1) On the valley floors there are open, undefended sites, usually with the buildings oriented around plazas. For the most part these date from the Maya Classic period, and, as the land has been cultivated for centuries since their abandonment, they are poorly preserved. (2) Potentially defensive sites have natural defensive features such as surrounding ravines or barrancas. (3) Defensive sites are located on hill tops or plateaus and have added protection in the form of walls or fosses. For the most part they are protohistoric and the buildings are ordered to fit the irregular terrain. Individual sites undoubtedly changed their function during the occupancy.

Masonry ball courts evidently were of great importance to the highland Maya, for almost every settlement has one. Four types occur. (1) Open-end courts with no end zones. These are the earliest and are found in the undefended sites with Classic Maya pottery. (2) An

open-end type which holds the principal position in an assemblage including a temple and altar platform. This is assigned to the Postclassic period. (3) Courts with low walls defending the end zones which are probably Postclassic. (4) Courts with high enclosed end zones and stairways found in defensive sites of protohistoric date. These architectural features are tabulated by sites in Table I, and the associated pottery styles are also given. A second table records the distribution of common stylistic traits derived from the Mexican plateau.

An important phase of this report is the evidence concerning chronology derived from a study of pottery gathered at 45 sites (Table I). For the most part collections were made of surface sherds, which were typed by A. V. Kidder and R. E. Smith. Such sherd lots should give a good if not infallible indication of the span of occupancy at individual sites but they do not date individual structures when several periods are involved. Only in a few cases was it possible to obtain sherds from inside buildings.

In recent years, the archaeology of Guatemala has become a nightmare to the student or general reader because each excavator has assigned an incomprehensible and arbitrary series of names to his ceramic styles and periods. The present author designates periods by well known terms and assigns dates allowing for a lag in ceramic development between the lowlands and highlands of Guatemala, as follows: Preclassic (?-A.D. 300), Early Classic (300-600), Late Classic (600-950), Postclassic (950-1200), Protohistoric (1200 to the Conquest). A valuable contribution is the correlation of 28 other names with the above (pp. 2-3).

The illustrations in this volume are exceptional. Though called "figures," they are in fact full page plates. They comprise 27 pages of photographs, 92 pages of site plans and surveys of individual buildings, 4 maps, 6 restoration sketches by Stephan F. de Borhegyi and Kisa Noguchi Sasaki, and 10 rendered perspective drawings of sites or groups by Tatiana Proskouriakoff. These show the buildings restored in their natural setting. The magnificent scenery was in all cases sketched on the spot. These drawings and the restored edifices at Zaculeu give us the closest approximation we probably shall ever have to the appearance of an ancient Maya communities in highland Guatemala.

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Monumento Megalitico y Petroglifos de Chacuey, República Dominicana. Emile de Boyrie Moya. Publicaciones de la Universidad de Santo Domingo, Serie VII, Vol. 97, No. 1, Ciudad Trujillo, 1955. 223 pp., 8 figs., 63 pls.

Although the so-called "ball courts" or "dance plazas" are an outstanding feature of the archaeology of the Greater Antilles, few of them have been thoroughly investigated. De Boyrie Moya's detailed report on the dance plaza of Chacuey, which he discovered in 1947 and investigated more fully in 1948, 1951, and 1952, is therefore a significant addition to the literature on Caribbean archaeology. It ranks with J. Alden Mason's "A Large Archeological Site at Capá, Utuado" (1941, *N.Y. Acad. of Sci., Sci. Survey of Porto Rico and the Virgin Is.*, Vol. 18, Pt. 2) as the only full monographs on this type of site.

The description of the site is a credit to de Boyrie Moya's training as an engineer. There are accurate maps, cross sections, and a series of photographs which have apparently suffered in the process of reproduction. The structure is compared with other dance plazas in the Antilles, but here de Boyrie Moya has overlooked the most striking resemblance: with the site of Palo Hincado near Barranquitas, Puerto Rico, where there is also a more or less oval dance plaza with 3 causeways (there is only one at Chacuey) extending from the plaza to streams or, in the case of the third causeway, a half a mile up a mountain side (Irving Rouse, 1952, "Porto Rican Prehistory," *N.Y. Acad. of Sci., Sci. Survey of Porto Rico and the Virgin Is.*, Vol. 18, Pt. 4, p. 486, Fig. 5). Upright stone slabs occur at both sites, but they have been found marked with petroglyphs only at Chacuey.

De Boyrie Moya dug a series of test pits at the site, some in conjunction with J. M. Cruxent of Venezuela, who collaborates in an appendix describing the ceramic finds. Since the pottery is of the Boca Chica style, the 2 authors place the site in either Period IIIa or IVa, in agreement with the reviewer's revised chronology for the area (Rouse, 1953, "The Circum-Caribbean Theory, an Archeological Test," *Amer. Anthrop.*, Vol. 55, p. 191, Fig. 2). De Boyrie Moya also makes certain corrections in the reviewer's differentiation between the Boca Chica style of the Dominican Republic and the Carrier style of Haiti which appear to be well justified by his evidence.

As is usual in such sites, pottery was found only in the area outside the plaza. In Puerto Rico the reviewer (Rouse, 1952, p. 360) has considered this evidence of permanent habitation surrounding the plaza. De Boyrie Moya, on the other hand, assumes that the Indians stayed at the site only during ceremonies — that it was a ceremonial center rather than a place of residence. More intensive excavation in the area surrounding the plaza is needed to settle this difference of interpetation.

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The Art of Ancient Peru. Heinrich Ubbelohde-Doering. Second edition. Frederick A. Praeger, New York, 1954. 56 pp., 5 figs., 240 pls., 4 color pls., 1 map. $12.50.

Though labeled "Second edition," this is technically a second printing of the first American edition of 1952. There are no changes; even minor errors are not cor-

rected. In the copy sent to this journal for review there was one new error: the line cut on page 18 was omitted.

The Art of Ancient Peru is primarily a collection of excellent photographs superbly reproduced, and it is clearly designed to give the general reader an impression of the richness and variety of ancient Peruvian art. It fulfills this function admirably, and the fact that a second printing was needed after only 2 years indicates that a considerable audience found the book interesting.

An excellent general review of the first printing was contributed by Richard P. Schaedel to *Archaeology* (1953, Vol. 6, No. 4, pp. 250-1) and the reader is referred to it for discussion of the selection of materials illustrated and a critique of the brief introduction (12 pages). I want to add here some comments on the utility of the book for archaeological research, referring mainly to the information given in the notes to the illustrations (32 pages, making up the bulk of the text). The reader must bear in mind that the book is not presented as a research contribution, and it would not be fair to judge it on the basis of its research value. Still, the archaeologist has a right to ask how useful it can be to him.

The first point to note is that, although the author has himself carried out excavations in Peru, he displays little concern for archaeological associations. Relatively few of the specimens illustrated have reliable site provenience, and even fewer are ones with excavation data relating them to other specimens and construction features. There are in existence plenty of artistic Peruvian specimens with very detailed association data, but Ubbelohde-Doering made his selection on other grounds. He does not base his interpretations on archaeological associations in any systematic way, either, and they are of very questionable reliability as a result.

I identified 20 specimens in *The Art of Ancient Peru* which appear to have been collected in the course of Ubbelohde-Doering's own field work in 1931-32 and 1938. They come from the following sites: Los Majuelos (Nazca), Plates 46 and 50, from the same grave; Atarco (Nazca), Plates 92 and 114; Chillo (Nazca), Plate 135 *b*; Cahuachi (Nazca), Plate 143; Estaquería (Nazca), Color Plate I; Locarí (Nazca), Plate 116; Huayurí (Nazca), Plate 138 and Color Plate III; Pacatnamú (Pacasmayo), Plates 192, 226, 227, and 234; Facalá (Chicama), Plate 213; Huaca de la Campana, Pampa del Jagüey (Chicama), Plates 169, 170-1, 172-3, 198-9, and 200. The last 2 specimens are from the same grave. The reliability of the provenience data on the specimens not collected by the author varies greatly, and he provides the reader with little guidance in evaluating it.

A second problem in using Ubbelohde-Doering's illustrations for research purposes is that he does not always show the whole specimen. I counted 40 specimens, many of them illustrated in 2 to 4 photographs each, of which no complete view is given. Fifteen of these are Moche stirrup-spout vases in which the stirrup spout is not shown. The author's failure to show the stirrup spouts in these cases — and in 2 others where the whole vessel is shown, but from such an angle that the spout is hidden — is particularly regrettable, since the dating of Moche pottery is based on spout typology.

It is unfortunate that, of the 3 Paracas style vessels illustrated, one (Pl. 161) should be a fake. The author can hardly be blamed in this case, because the fraud was only exposed in 1954 when the maker of this and several other similar pieces gave a reasonably circumstantial account of his activities to the Peruvian newspapers.

Finally, I should like to add 2 pieces of information missing from the notes to the illustrations. The silver dish shown in Plate 44 is in the Instituto Arqueológico, Cuzco. The gold collection illustrated in Plate 228 is reported to come from the Huarmey valley.

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Monumentos Históricos y Arqueológicos de América. Comisión de Historia, Instituto Panamericano de Geografía e Historia, Mexico, 1950-1953.

A more descriptive title for this series of books might be "A History of the Movements for Conservation of National Antiquities." Nations in this hemisphere have become increasingly aware of the need for investigation, preservation, and interpretation of significant sites and buildings. Each country has done something. These books summarize the deeds, in the belief that interchange of information will facilitate progress. So far, 9 volumes have been published (mostly in Spanish): Panama, United States (in English), Brazil (in Portuguese), Chile, Haiti (in French), Guatemala, Mexico, Honduras, and Ecuador. Average price per volume is about 15 Mexican pesos.

Formats are generally similar. Each book contains an introduction, a history of pertinent legislation, notes on recent developments and trends, numerous illustrations, a bibliography, and index. In addition, each volume reprints the text of legislative acts which have established national policies in conservation, from the first decrees of the 19th century down to the most recent of laws. The student of historical conservation will find these data invaluable. The books average about 120 pages, including some 30 pages of illustrations. Notable exception is the folio on Mexico with 484 plates. Although each of the texts is written with authority, some of the books are more comprehensive than others. For instance, Daniel F. Rubin de la Borbolla, writing on Guatemala, devotes a chapter to the various institutions, such as federal agencies, universities, and museums, charged with care of the cultural resources of the state. In another volume, Ronald F. Lee lists all the historical and architectural monuments in the National Park System of the United States, and discusses the methods of administering them for public benefit. Most of the plates are tersely identified photographs of spectacular ruins or of architectural details, to illustrate the various

types of ruins extant in each country. The pictures, of fair quality, seem to be about equally divided between historic and prehistoric subjects.

A perusal of the volumes cannot but impress the reader with the wealth of archaeological and historical remains in this hemisphere. But since the obvious aim of the publication is international enlightenment at policy and administrative levels, it is doubtful that the work will receive more than casual attention from the anthropologist.

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Culturas Precolombinas de Chile. GRETA MOSTNY. Editorial del Pacífico, Santiago de Chile, 1954. 125 pp., illus.

This volume is one of a series of brief but comprehensive summaries called Colleccion Síntesis. Mostny provides an adequate summary of the pre-Columbian cultures of Chile. Although she offers little to readers of English that is not in the various summaries of aboriginal Chilean cultures in the *Handbook of South American Indians*, she performs a valuable service for the Spanish reader by presenting useful and reasonably complete condensations of these summaries in a single handbook. A map and a more representative bibliography would have greatly enhanced the usefulness of the book. Since the book is no more than a synthesis of previously published sources, Mostny should not be criticized for glossing over contradictory data for the sake of simple and concise presentation. The following observations, therefore, are offered primarily for those who may wish to consult the book as a definitive reference.

The archaeological cultures of the late pre-Incaic periods in Chile have been barely defined, much less identified with historically and ethnographically known peoples (except for the Atacameño, Yahgan, and Alacaluf). Mostny does not make this point clear in her reconstruction; she oversimplifies her cultural summaries by indiscriminately mixing archaeological, ethnographic, and historical data.

Mostny follows Uhle and Latcham in identifying the agriculturalists of the far northern Chilean coast with the Atacameño of the oases of the Desert of Atacama. However, the scant historical record and the growing archaeological evidence indicate 2 distinct cultures. In discussing the cultural sequence for far northern Chile, she compares Arica I and II with Pichalo I and II as though they were exactly contemporaneous phases. Bird, who defined these phases, established them as independent sequences. Pichalo I is generally considered to be earlier than Arica I, and the cross-dating of Pichalo II is nebulous. Although Mostny is the first Chilean writer to join Kroeber and Bird in denying the validity of Uhle's distinction between Chincha and Atacameño, she underestimates the importance of pottery decoration for distinguishing between the Arica I and II phases which supplant Uhle's stylistic division.

The designation of "Diaguita" for the agriculturalists of the La Serena area (Copiapo to Choapa) has been successfully challenged by both Chilean and Argentine scholars, yet Mostny perpetuates this misnomer without citing any additional evidence in its support. We are told that not only the "Diaguita" but also their Molle predecessors had villages of compact houses in contrast to their southern neighbors. This is contrary to all the archaeological evidence, which indicates that the La Serena region represents the first break (from north to south) in the Andean pattern of permanent village settlements in agricultural zones.

Readers should also be cautioned against accepting as proven an intrusive, nomadic origin for the warlike Mapuche or the identification of the Changos as the last survivors of the preceramic fisherfolk. These 2 hypotheses of Latcham must await considerable archaeological and ethnohistorical research before they can be either accepted or rejected.

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ANNUAL MEETING OF THE SOCIETY FOR AMERICAN ARCHAEOLOGY, 1956

The 21st Annual Meeting of the Society for American Archaeology was held on Thursday, Friday, and Saturday, May 3, 4, and 5, 1956, at the University of Nebraska and the Nebraska State Historical Society, Lincoln, Nebraska. Total registration at the meeting was 130, and a number of unregistered persons attended the programs of the Society.

Meeting of the Executive Committee

As required by Article VI, Section 3, of the Society's Constitution, the annual meeting of the Executive Committee was held prior to the annual business meeting of the Society. An account of this meeting is included in the report of the Secretary.

Annual Business Meeting

The annual business meeting was called to order by President William Duncan Strong at 11:20 a.m. on Friday, May 4, 1956. About 75 members were present.

The minutes of the 20th Annual Meeting were approved as published in American Antiquity, Volume 21, Number 2, pp. 210-13 (October, 1955).

The report of the Treasurer (printed below) was read and accepted by the membership on the recommendation of the Auditing Committee (H. Marie Wormington, David A. Baerreis, Waldo R. Wedel).

The report of the Editor (printed below) was read and accepted by the membership.

The report of the Secretary (printed below) was read and accepted by the membership.

The report of the Elections Committee (Volney H. Jones; B. Bruce Powell; Albert C. Spaulding, Chairman) was included in the Secretary's report. The result of the mail ballot was (394 ballots received):

President: William A. Ritchie

First Vice-President: William H. Sears

Second Vice-President: Erik K. Reed

Secretary: David A. Baerreis

Members of the Executive Committee (to 1958): Frederick Johnson, J. Alden Mason.

The following amendments were passed:

That the second sentence of Article V, Section 1, of the Constitution be amended to read "An Executive Committee shall be comprised of the President as Chairman, the First Vice-President, the Second Vice-President, Secretary, Treasurer, Editor, and four members elected at large."

That Article I, Section 2, of the By-Laws be amended to read "The Annual Dues of Active Members shall be fixed by the Executive Committee."

That the second sentence of Article I, Section 6, of the By-Laws be amended to read "The annual cost of subscription shall be fixed by the Executive Committee."

New Business

Carl H. Chapman gave a short report on the current status of salvage operations in archaeology.

Two motions were proposed from the floor by James B. Griffin. The first instructed the Executive Committee to consider the establishment of a Society for American Archaeology news letter to serve as an amplification of the "Notes and News" section of American Antiquity. The second motion directed the President to appoint a committee composed of 3 professional and 3 amateur archaeologists to investigate the affiliation of state and local societies with the Society for American Archaeology and to report their findings and recommendations at the 22nd Annual Meeting. Both motions were seconded and passed after some discussion. In connection with the first motion, it was pointed out that an inexpensively printed news letter could carry a large volume of fresh information obtained through local societies and thus serve a clearing house function.

The following resolutions were presented by the Committee on Resolutions (Douglas S. Byers, J. Charles Kelley) and accepted by the membership:

Resolved: That the Society for American Archaeology expresses its thanks to the Chancellor of the University of Nebraska for the hospitable reception accorded the Society.

Resolved: That the Society for American Archaeology expresses its thanks to John L. Champe, Marvin L. Kivett, and Robert L. Stephenson and our other gracious hosts of the Department of Anthropology, the Nebraska State Historical Society, and the River Basin Surveys.

Resolved: That the Society for American Archaeology expresses its thanks to John M. Corbett and the Program Committee for arranging a stimulating and informative program.

Resolved: That the Society for American Archaeology assembled at its 21st Annual Meeting expresses deep sense of loss in the death of George W. Brainerd, Frederic H. Douglas, and George F. Will, and extends its sympathy to their families.

The annual business meeting adjourned at 12:15 p.m.

Annual Dinner

The annual dinner was held on May 4 at 6:30 p.m. at the Cornhusker Hotel, Lincoln, with Wm. Duncan Strong as presiding officer. "The Hunters," a documentary film on African Bushmen by John Marshall, was shown and commented on by J. O. Brew. A total of 107 persons attended the dinner.

Other Sessions

Thursday, May 3, morning. E. Mott Davis, Chairman.

1. Irving Rouse: "Application of the Concept of Co-Tradition to the American Southwest."

2. Albert C. Spaulding: "Seriation and Probability."

3. Waldo R. Wedel: "Why the Great Plains Are Treeless."

4. James B. Griffin: "Radiocarbon Dates and the Hopewell Culture."

5. John S. Tarr: "Pollen Analysis at the Modoc Rockshelter."

Thursday, May 3, afternoon:

William J. Mayer-Oakes, Chairman: Symposium on the Local Archaeological Society.

Friday, May 4, morning. Arnold M. Withers, Chairman.

1. Ross T. Christensen: "Archaeological Study of the Far North Coast of Peru."

2. Verla Birrell: "Unique Textile Finds from Paracas Cavernas."

3. Robert L. Stephenson: "Pottery from the Accokeek Site, Maryland."

Friday, May 4, afternoon. Albert C. Spaulding, Chairman.

1. Ruth DeEtte Simpson: "The Tule Springs Archaeological Area."

2. Douglas Schwartz: "Grand Canyon Split-Twig Figurine Complex."

3. L. S. Cressman: "Progress Report on Excavations on the Columbia River East of the Dalles, Oregon."

4. Reynold J. Ruppé: "Recent Archaeological Discoveries in Iowa."

5. John C. Ives: "Comments on Mill Creek Ceramic Analysis."

6. William J. Mayer-Oakes: "Carnegie Museum Excavations at the Varner Site, 36 Gr 1."

7. Fred Wendorf, Chairman: Symposium on Highway Salvage Archaeology.

Saturday, May 5, morning. H. Marie Wormington, Chairman.

1. Amos R. Green: "A New Industry Found in Southwestern Michigan."

2. Robert C. Euler: "Pounding Stones in the Southwest."

3. Stephen Williams: "The Island 35 Mastadon and Possible Associated Artifacts."

4. Melvin L. Fowler: "Archaic Projectile Point Styles, 2000-6000 B.C."

5. Alex D. Krieger: "Problems in American Projectile Point Typology."

6. E. Mott Davis: "Possibilities for the Study of the Intermediate Lithic Period in Western Nebraska."

7. David S. Gebhard: "Northern Contacts of the Fremont Culture."

8. James H. Gunnerson: "Promontory Point-Plains Relationships."

Report of the Secretary

Committees. The following regular committees were appointed by President Strong and approved or elected by the Executive Committee as required by the Constitution and By-Laws of the Society.

Nominating Committee: Waldo R. Wedel, Chairman; Arnold M. Withers; Gordon R. Willey.

Viking Fund Award Committee: Alex D. Krieger (non-voting chairman), Hallam L. Movius, Jr., Emil W. Haury, Frank H. H. Roberts, Jr., Alfonso Caso, Gordon R. Willey, William Duncan Strong, H. E. D. Pollock, J. L. Giddings, Jr., Preston Holder, Jesse D. Jennings, Fred Wendorf, Jack T. Hughes.

Program Committee: John M. Corbett, Chairman.

Committee on Local Arrangements for Twenty-first Annual Meeting: John L. Champe, Chairman.

Auditing Committee: H. Marie Wormington, David A. Baerreis, Waldo R. Wedel.

Committee on Resolutions: Douglas S. Byers, Chairman; J. Charles Kelley.

Elections Committee: Albert C. Spaulding, Chairman; Volney H. Jones; B. Bruce Powell.

A special *Highway Archaeological Salvage Committee* appointed by President Strong consists of: Fred Wendorf, Chairman; Irving Rouse (Atlantic Coast); William H. Sears (Southeastern); John C. McGregor (Central States); L. S. Cressman (Pacific Coast); W. J. Kellar (B.P.R. representative); Clifford Evans, Jr. (Washington representative); S.A.A. President, ex officio; S.A.A. Secretary, ex officio.

Other Activities. The following appointments were made by President Strong with the approval of the Executive Committee: Representative to the American Association for the Advancement of Science (for 3 years), Dorothy Cross Jensen; Program Chairman for special meeting at the 1956 meeting of the American Anthropological Association (Santa Monica), Clement W. Meighan; Delegates to the International Congress of Anthropological and Ethnological Science (1956), Gordon F. Ekholm, Irving Rouse, and Robert Wauchope; and delegates to the International Congress of Americanists (1956), Emil W. Haury and William S. Laughlin.

J. Eric S. Thompson was chosen by the Viking Fund Award Committee as the 1955 medalist.

The Nominating Committee presented the following names for the 1956 election of officers: for President — Henry B. Collins, Jr., William A. Ritchie; for First Vice-President — William H. Sears, Charles C. Di Peso, Carl H. Chapman; for Second Vice-President — Erik K. Reed, J. M. Cruxent, J. B. Wheat; for Secretary — David A. Baerreis; for First Executive Committee member (to 1958) — Frederick Johnson, Kenneth E. Kidd, Robert E. Bell; for Second Executive Committee Member (to 1958) — Clarence H. Webb, J. Alden Mason, Robert L. Stephenson.

The Executive Committee held a special meeting in Boston on November 17, 1955, and its regular annual meeting in Lincoln on May 3, 1956. Its actions during the fiscal year (other than approval of the appointments noted above) included proposal of the amendments to the Constitution and By-Laws which subsequently appeared on the ballot, acceptance of the invitation of the University of Wisconsin to hold the 1957 annual meeting at Madison, approval of the dates May 3-5 for the 1956 annual meeting, reception of invitations for the 1958 annual meeting by the University of Oklahoma and the University of Michigan, approval of the Editor's, Treasurer's, and Secretary's reports for 1955-1956, and approval of the proposed budget for 1956-1957 prepared by the Treasurer.

Four summer seminars made possible by a generous grant from the Carnegie Corporation of New York administered by Tulane University (see Secretary's Report, Annual Meeting of the Society for American Archaeology, 1955) were held in 1955. They were:

Stability and Instability in Prehistoric Cultures. Ann Arbor; Emil Haury, Chairman.

Evolutionary and Functional Implications of Community Patterning. Washington; Richard K. Beardsley, Chairman.

The American Southwest: A Problem in Cultural Isolation. Santa Fe; J. D. Jennings, Erik K. Reed, Co-chairmen.

Prehistoric Culture Contact. Cambridge; Gordon R. Willey, Chairman.

Preliminary results of the seminars were read as the 4 papers of a special session at the annual meeting of the American Anthropological Association at Boston on November 17, 1955. The session was cosponsored by the Society for American Archaeology. Preparations for publication of the seminar reports as a Memoir of the Society under the supervision of Robert Wauchope has reached an advanced stage.

The Secretary's office conducted the usual correspondence relating to applications for membership and other matters. All constitutional requirements with regard to the nominating committee, announcements of meeting and call for papers, and elections were fulfilled.

Respectfully submitted,

ALBERT C. SPAULDING, *Secretary*

REPORT OF THE TREASURER FOR 1955-1956

General. The fiscal year here reported was the first complete year under our arrangement with the new A.A.A. Executive Secretary. Several problems of coordination of effort between the Treasurer and the A.A.A. Executive Secretary have been discovered and steps taken to make this working relationship more effective. Maintainance of a complete, accurate, and up-to-date membership list continues to be a major problem, and plans to simplify and improve the present system are under way.

Finances. As in previous years our major expense was for preparing, printing, and distributing our journal. Charges to authors and sales of publications continue to contribute heavily to our income. In addition, the Society received generous publication subsidies this year. The main source of income, however, continues to be dues from the membership.

The total financial picture remains promising, however. Income for 1955-56 was greater than the budgeted estimate in every category, and most items of expense were somewhat less than estimated. Expenditures for AMERICAN ANTIQUITY were up only slightly over the budgeted amount. We have thus completed our year with a modest but encouraging increase in funds available for reserve or for enlarging the operations of the Society.

Membership. The Treasurer's report for 1954-55, as published, did not include the membership as of April 30, 1955, which was as follows:

Individual	941
Life	11
Institutional	260
Total	1212

Membership as of May 1, 1956, was as follows:

Individual	969
Life	11
Institutional	282
Total	1262

FINANCIAL STATEMENT FOR MAY 1, 1955, THROUGH APRIL 30, 1956

A. WORKING FUND

1. *Receipts*

a. Balance forward May 1, 1955	$ 2526.94
b. Dues received	7797.18
c. Charges to authors for engravings	831.50
d. Charges to authors for reprints	1103.50
Total	$12,259.12

2. *Expenditures*

a. Printing AMERICAN ANTIQUITY (4 issues)	$ 6687.30
b. Distributing AMERICAN ANTIQUITY	377.23
c. Printing authors' reprints	741.00
d. Editorial assistant	800.00
e. Editor's office expense	239.05
f. Secretary's office expense	31.49
g. Treasurer's office expense	24.78
h. Associate Editors' office expenses	60.60
i. Charge for collecting dues at $.25 each	315.25
j. Annual meeting, 1955	105.26
k. Annual meeting, 1956	58.60
l. Memoir 12, costs for preparation	168.43
m. Refund of overpayments	9.50
n. Loss on exchange	.50
Total	$ 9618.99

3. *Cash Balance*, May 1, 1956		$ 2640.13
4. *Outstanding*, May 1, 1956		
a. Accounts receivable	75.50	
		75.50
5. *Total Assets, Working Fund*		$ 2715.63
B. PERMANENT FUND		
1. Total on hand, April 30, 1955		$ 665.06
2. Interest		6.66
3. Total on hand, April 30, 1956		$ 671.72
C. PUBLICATION FUND		
1. Total on hand, April 30, 1955		$ 1645.76
2. Interest		16.48
3. Sale of back issues of journal		688.80
4. Sale of Memoirs		279.39
5. Subsidies for publication		
a. From Wenner-Gren Foundation, for illustrations in Volume 21, No. 4	$ 100.00	
b. From Wenner-Gren Foundation, for Memoir 13	1000.00	
c. From Rand McNally and Co., advance towards costs of Memoir 12	200.00	
		$ 1300.00
Total		$ 3930.43

BUDGET FOR 1956-1957

Receipts		
a. Balance brought forward	$ 2700.00	
b. Dues for 1956-1957	7800.00	
c. Sale of back issues	600.00	
d. Sale of Memoirs	200.00	
e. Charges to authors for reprints	1000.00	
f. Charges to authors for engravings	500.00	
g. Transfer from Publication Fund	1200.00	
Total Receipts		$14,000.00
Expenditures		
a. Printing AMERICAN ANTIQUITY	$ 7000.00	
b. Printing Memoirs	1200.00	
c. Distributing AMERICAN ANTIQUITY	500.00	
d. Printing authors' reprints	750.00	
e. Editorial assistant	800.00	
f. Editor's office expense	300.00	
g. Associate Editors' office expenses	75.00	
h. President's office expense	50.00	
i. Secretary's office expense	100.00	
j. Treasurer's office expense	100.00	
k. Charge for collecting dues	325.00	
l. Annual meeting	150.00	
m. Subsistence at annual meeting (Pres., Sec., Treas., Ed., if necessary)	100.00	
n. Balance forward, May 1, 1957	2550.00	
Total Expenditures		$14,000.00

Respectfully submitted,
WILLIAM J. MAYER-OAKES, *Treasurer*

REPORT OF THE EDITOR

For the year ending in April, 1956, AMERICAN ANTIQUITY published 460 pages, our largest volume yet. On the basis of manuscripts received, however, this was not enough, and our backlog has steadily increased so that the lag between receipt and publication is now a little over a year. This is about the same as for the *Anthropologist*, less than for *American Folklore*, but certainly too much. Only 2 alternatives seem possible, to increase the size of the journal or reject more of the manuscripts received. We cannot print more pages without a larger income, so the rejection of meritorious manuscripts becomes painfully necessary.

Costwise, the 460 pages published this past year were edited, printed, and distributed for about $17.60 per page (compared with about $17.75 for the preceding year). By charging authors most of the cost of reprints and a major part of the cost of illustrations we supplement our dues sufficiently to stay solvent, but both of these charges should be reduced when possible. As for publishing more pages, a rough estimate indicates that it would cost around $1000.00 to put out 16 more pages each issue. Fewer additional pages are not practical.

But the number of pages or the cost per page should not be our main concern, important as they may loom. The Editor conceives the function of AMERICAN ANTIQUITY to be the publishing of significant contributions to New World archaeology, wherever they may come from. The desirable balance between areas is occasionally hard to achieve — at the moment a preponderance of manuscripts deal with Latin America — but over the years no area, topic, or point of view should be slighted. A more serious problem results from the tendency of archaeologists to write descriptive reports of field work and to postpone, sometimes forever, the more general syntheses which give their data broader meaning. The scarcity of such articles in some of our issues puts an emphasis on the descriptive level of reporting that does not seem to fully achieve the aims for which our journal was founded.

During the past 12 months the Editor received 87 manuscripts (exclusive of memoir-length), somewhat less than during the preceding year. Of these 27 were rejected, 4 of them being placed in more suitable journals by the Editor, and several others being accepted elsewhere partly at the Editor's suggestion. Authors withdrew 5 manuscripts after acceptance. Of the rest all will be in print within the year.

Of 7 memoir-length manuscripts considered, 3 are still in the stage of preparation or consideration (with no financing assured if they are completed and accepted), 1 has been rejected, and 3 are in press. These are *Seminars in Archaeology: 1955*, which was financed by the Carnegie Corporation and is appearing with the cooperation and assistance of Robert Wauchope; *Archaeological Evidence of Pre-Spanish Visits to the Galápagos Islands*, by Thor Heyerdahl and Arne Skjölsvold, for

which the entire cost is being contributed to the Society by Rand McNally and Co.; and *Modern Yucatecan Maya Pottery: A Study of the Nature of Archaeological Inference*, by R. H. Thompson, for which most of the costs are being met by the Wenner-Gren Foundation and the University of Kentucky.

Volume 21 contained 24 articles, 29 shorter contributions under "Facts and Comments," and 82 reviews. The last represents a substantial increase, and it is believed that the more adequate coverage of the literature of New World archaeology and of related fields well merits the slight extra space needed. A similar expansion of Notes and News seemed unnecessary, but we have tried to increase its usefulness through complete but concise coverage, and mention of the purpose and meaning of current research as well as the names and places involved. The Editor is greatly indebted to both the Review Editor and the Notes and News Editor for their tireless efforts, as well as to the Assistant Editors and the reviewers who generously make these departments possible. Also, the University of Utah Press continues to serve us efficiently and to extend to us many courtesies and kindnesses. Lastly, I would like to express my sincere appreciation to the authors whose patience with editorial foibles, with pecuniary demands, and with the tedious process of publishing help make editing enjoyable as well as educational.

Respectfully submitted,

RICHARD B. WOODBURY, *Editor*

OFFICIAL NOTICE

As required by the By-Laws, Article II, Section 2, the names and addresses of the Nominating Committee for 1956-57 are listed herewith: Douglas Osborne (Chairman), Department of Anthropology, University of Washington, Seattle 5, Washington; Terah L. Smiley, Laboratory of Tree-Ring Research, University of Arizona, Tucson, Arizona; and John M. Longyear III, Colgate University, Hamilton, New York. The offices to be filled are President, 1st Vice President, 2nd Vice President, Treasurer, and 2 members of the Executive Committee. Members are reminded that they may suggest names for nomination, to the Nominating Committee, before December 1, 1956.

NOTES AND NEWS

EDITED BY CLEMENT W. MEIGHAN

American archaeology seems definitely to be entering an "age of synthesis" with an increasing number of papers and meetings aimed at extracting broad generalities from the rapidly accumulating site reports and descriptive records. Several of the group attempts at synthesis have been reported in *Notes and News* during the last year. The latest such meeting was a conference on Early Lithic and Archaic cultures in North America, held April 27 and 28 at Phillips Academy, Andover. The conference was organized by Frederick Johnson and financed by the R. S. Peabody Foundation and the Wenner-Gren Foundation for Anthropological Research. Ten archaeologists from different parts of the country attended. The first day was devoted to presentation of regional data. On the second day, an over-all chronological chart was attempted, and the group attempted to draw general conclusions. A discussion of cultural-chronological correlations was given by Albert C. Spaulding, and Gordon R. Willey acted as chairman in a session devoted to a definition of technological stages.

Any synthesis attempting to include the whole of North America must inevitably remain tentative until more of the crucial factual data are available. Members of the conference were nonetheless able to agree on the existence of 4 technological stages in preagricultural North America, all of which have very broad geographic distributions. The 4 stages were given the following terms:

1. Unspecialized lithic
2. Specialized lithic (lanceolate and fluted point traditions)
3. Unspecialized archaic
4. Specialized archaic

The adjectives apply to technological features, not to economy or ecological adaptation. It was also clearly brought out that the stage criteria must be typological, not chronological, for some of the simplest stages existed until the time of European settlement in some parts of the continent. The conference felt itself to be on reasonably sure ground in describing the stages, with the exception of the so-called "unspecialized lithic." Although many sites appear to fit the typological description for such a stage, there was some question as to whether these sites were actual *occupation* sites or merely quarries, scattered debris, and similar manifestations. Further discussion and definition of the problems raised will appear in future reports by the conference participants.

ARCTIC

The following report consists entirely of overseas news from our Danish colleagues who have done so much memorable research in the North American Arctic.

In the summer of 1954 Eigil Knuth discovered some paleo-Eskimo remains while on a brief stopover at Kap Holbaek in the interior of Danmark Fjord, northeast Greenland; he returned there in 1955 to investigate the area more thoroughly. On May 30, 1955, he left Station Nord in company with Kristen Sorensen, and after 20 days of travel over fiord and sea ice the 2 men reached Kap Holbaek. This trek is an excellent example of the rigorous work which frequently confronts a field man in the far north. On the journey Knuth and Sorensen each dragged a "pulk" loaded with 200 pounds of gear, and an additional 500 pounds of equipment was air-dropped to them in 3 separate places by an American plane. Although the straight line distance from Station Nord to their destination is 185 km., the men were forced by deep, soft snow to make double trips with half-loads, and thus had to walk a distance of 325 km. to reach their objective. Eight sites were discovered, seven of them paleo-Eskimo, and the evidence suggested that these had been peopled in 2 different migration periods. One of the sites was found on Pinseskaeret, midway on the west side of Danmark Fjord; 5 others were situated on Kap Holbaek (one of them being neo-Eskimo), one site was found at Lolland Sø, and one at the head of Naestved Fjord. Besides these major concentrations, caches were noted on Islandssletten and in Campanuladalen, about 17 km. southeast of Kap Holbaek. Sketch maps were made of the Kap Holbaek sites, and 7 dwellings there were measured and drawn. Collections made in this area include 240 artifacts of bone and flint, and over 1000 other pieces of flint, all of them belonging to paleo-Eskimo culture.

The Danish National Museum sent another expedition to the Disko Bay area of western Greenland during the summer of 1955. Erik Holtved was the leader, and his group included Therkel Mathiassen and Svend Jørgensen of the National Museum, Jørgen Troels-Smith of the Geological Survey of Greenland, Mrs. Troels-Smith, Inge Parbol, and Peter Wordie and Alick Sherrif, both from Cambridge, England. The plan of the expedition was to continue excavation of the huge midden at Sermermiut in Jakobshavn Isfjord where the National Museum Expedition of 1953 had discovered 3 distinct culture strata, each of which represented a different form of Eskimo culture. It was also hoped that these occupations might be dated by means of pollen and radiocarbon analysis. Three separate profiles were cut through the midden, the largest of them measuring 20 m. in length and about 2 m. high in the central part of the midden. In order to establish a standard pollen diagram for the Disko Bay area. Troels-Smith and Jørgensen made 4 borings in Lake Akinap Tasia Avangnardleq just north of Jakobshavn. They also surveyed northern Disko Bay and investigated several paleo-Eskimo sites for carbon samples. Holtved and Parbøl remained in Greenland until late September, and con-

tinued the ethnological research which the National Museum has been conducting since 1948 in the Disko Bay and Holsteinborg district.

In the summer of 1956 Jørgen Meldgaard spent a month in West Greenland making the first archaeological survey ever undertaken in the Holsteinborg district. He flew thence to the Hamilton Inlet area of Labrador where he spent 2 months searching for paleo-Eskimo sites. In this vicinity he also studied the topography of the Labrador coast in the hope of finding some concordance with topographical descriptions in the sagas of the Norse voyages to Vinland. William S. Laughlin, of the University of Wisconsin, who has been studying in Copenhagen since the fall of 1955, accompanied Meldgaard to Holsteinborg. There, in addition to helping Meldgaard, he bloodtyped the Greenlanders of that district and collected blood samples for Dr. Cahn of the University of Michigan.

Assembled by ELMER HARP

PACIFIC COAST AND GREAT BASIN

CALIFORNIA. R. F. Heizer, A. B. Elsasser, and M. A. Baumhoff have completed investigations in a dry lake-bed site in the Humboldt Valley, and of a portion of the terraces surrounding Winnemucca lake in western Nevada. Several burial, cache, fire, and storage pits were located and excavated and one pit cremation was exposed at the Humboldt Valley site. Charcoal collected for radiocarbon testing may further verify the already suspected temporal correspondence between the lake-bed and nearby Lovelock Cave. Cultural similarity between the 2 sites has long been observed. Preliminary survey of the terraces around Winnemucca Lake revealed that in addition to cave or rock shelter sites there might be evidence of early camp sites in the form of tufa-covered artifacts. At present the date of these artifacts is uncertain since the tufa covering could be caused by a late rise in the level of Lake Winnemucca. In any case, further investigation of the correlation of the levels of Lake Winnemucca with those of better-known Pyramid Lake is contemplated.

J. A. Bennyhoff and A. B. Elsasser have been engaged in a survey of the lower Sacramento Valley, particularly along the Cosumnes River. Several important new sites have been discovered, at least three of which should afford an excellent opportunity for controlled excavation in sites which appear to be related temporally and culturally.

F. A. Riddell has completed a manuscript reporting the excavation of an important occupation site in Lassen County (Las-7). It demonstrates that the site may be correlated with Central California Middle Horizon sites as well as with contemporaneous Great Basin sites. Riddell also conducted a test excavation of a site near Rose Springs, in Inyo County. The particular value of this site lies in its pottery stratification, with nonpottery lower levels and an upper level containing vessels of the Owens Valley Brownware type.

A cave site in Tehema County has been excavated by M. A. Baumhoff, J. A. Bennyhoff, and A. B. Elsasser. The site has a dry deposit, and numerous examples of textile material have been recovered. Data gathered from this site will supplement those dealing with Kingsley Cave, a large wet deposit rock shelter in the same vicinity, reported upon by Baumhoff in 1954 in the U. C. Archaeological Survey Report series.

WASHINGTON. George Coale has excavated in the Mt. Sheep and Pleasant Valley reservoirs. The work was supported by the Northwest Power Company which is building the dams which will create these reservoirs. The Northwest Power Company supported an original survey in the area with something over $1000; it supported excavation in the region to the extent of about $5000 and has agreed to furnish $2000 for laboratory work and publication.

Warren Caldwell, who recently completed his Ph.D. at the University of Washington, has been in charge of the Smithsonian Institution excavations in the Hell's Canyon and Brownlee reservoirs in the Snake River Valley. This work was supported by a grant of $12,000 from the Idaho Power Company to the Smithsonian Institution. It is anticipated that the grant will cover a certain amount of laboratory work and, it is hoped, publication expenses. Caldwell expects to wind up excavations in these 2 reservoirs shortly and to spend a month or two in Seattle writing up the results of the work.

Archaeological work in The Dalles Reservoir during the last 2 years has indicated that the area is far richer in archaeological remains than was previously suggested by the earlier surveys. As a result of this a special request was made to the Congress for the funds for a third season of excavation on the Washington side of the Columbia River. This was granted and during the summer B. Robert Butler and Edward Larrabee worked a large crew in the area. Work has been limited rather severely by the heavy flooding in early summer but it has been successful in throwing further light on the older occupations of the area. This has been especially true insofar as the lower levels of the great Wakemap Mound itself are concerned. Evidence has accumulated to show that cremation in the area is definitely precontact. Numerous items which will permit study of the development of local art have been salvaged from partially pot-hunted sites.

MONTANA. Montana State University, under a grant from the Washington Water Power Company, has completed an archaeological survey of Noxon Dam Reservoir. This construction is on the Clark Fork River, a tributary of the Columbia River. Archaeological sites were scarce, refuting the earlier contention of anthropologists and historians that this region was a thoroughfare between the Plains, to the east, and the Columbia Basin. It was territory occupied in early historic times by the Kalispel Indians. Eight sites were located, including occupation sites, 2 sets of battle pits, and a campsite. The University also continued the survey of the Upper

Clark Fork River, in Deer Lodge Valley, not far west of the continental divide. East of the continental divide, near Bozeman, Montana, a man-form outlined in boulders and about 17 feet in length has been discovered. Legs, arms, body, head, and a phallus are distinct.

Maynard Shumate, associated with Montana State University, reports some well-formed Scottsbluff and Eden Valley points from blowouts near Great Falls, Montana.

Assembled by R. D. DAUGHERTY

SOUTHWEST

ARIZONA. During the spring the Museum of Northern Arizona excavated a rock-lined subterranean pit house within half a mile of the Research Center. This Sinagua house was roughly rectangular and had an elevated step entrance; it is believed to date from Pueblo II. Near this house runs an irrigation ditch which apparently tapped a nearby creek. Several other houses lie close to the irrigation ditch. The Museum plans to continue excavation of houses that were occupied prior to the eruption of Sunset Crater, in order to establish the cultural assemblage of the inhabitants of the Flagstaff area. A second site of this type was also excavated in June; both houses show burning and may produce treering dates. David Breternitz, of the Museum staff, planned to survey the east slope of Elden Mountain to locate more houses of this type for excavation in the fall, and to examine during the summer some promising early man sites on the Navajo Reservation and near the proposed Glen Canyon dam site.

Paul Ezell, with 6 students from Arizona State College in Flagstaff, excavated 4 pit houses, a burial, and 2 cremations along the right of way of the El Paso Natural Gas Company pipeline. All the units resembled Winona houses. The Museum of Northern Arizona assisted Ezell in this work. During the summer Ezell conducted an archaeological survey on a new gas line running from Ashfork to Glendale, Arizona.

Douglas W. Schwartz, now Assistant Professor of Anthropology and Curator of the Museum of Anthropology, University of Kentucky, worked at the Museum of Northern Arizona during the summer, writing up the prehistory of the Cohonina.

Odd Halseth of Pueblo Grande in Phoenix reports that Don Heizer is now repairing and stabilizing a Casa Grande ball court which will form a permanent outdoor exhibit.

Charles C. Di Peso of the Amerind Foundation is currently excavating a Classic compound in the vicinity of Redington, Arizona, in the middle sector of the San Pedro drainage. Thus far, excavation has revealed a fortification built of rubble, in which the walls are bounded by a series of contiguous rooms. Ceramic associations indicate the use of Gila and Tonto Polychrome but very little Tanque Verde Red-on-brown.

The Southwestern National Monument's Archaeologist, Albert H. Schroeder, reports that Superintendent Meredith Guillet of Walnut Canyon National Monument has completed a new exhibit comparing the life of the Sinagua with that of the Anglo-Saxon at about A.D. 1100. With the assistance of Lee Abel, Guillet has also completed a model of the "Big House" at Casa Grande which will be used in experiments to determine a more satisfactory roofing for the ruin. He hopes that a plastic dome can be used. Stabilization work was carried on at Tonto, Casa Grande, and Wupatki National Monuments, and area histories have been completed for Tuzigoot, Tumacacori, and Casa Grande.

NEW MEXICO. W. C. Holden, of Texas Technological College, conducted the college's excavations in southeastern New Mexico from July 16 to August 21, in the area just north of Capitan Mountain, with a camp at the Turner Ranch. In September Fred Wendorf joined the Texas Technological College staff as Associate Professor of Anthropology and Assistant Director of the museum. He was replaced at the Museum of New Mexico by Stewart Peckham.

Bertha Dutton, of the Museum of New Mexico, during July and August led 2 groups of Girl Scouts in mobile camps, studying Southwestern archaeology. From August 18 to September 1 she excavated for the 6th season at Pueblo Largo with a group of 20 Scouts.

Since January the joint Highway Archaeological Salvage Program of the New Mexico State Highway Department and the Museum of New Mexico has excavated 6 sites. In February a fragmentary Pueblo II kiva and several surface rooms were dug near Espanola. In March 2 sites were dug; one, near Fruitland, was a 13 room Mesa Verde (Montezuma phase) pueblo and kiva; the other, in the Galisteo Basin, had 2 kivas, 8 small pit houses 5 to 10 feet in diameter, and parts of 2 surface rooms. Pottery from this site was predominantly Galisteo Black-on-white and Santa Fe Black-on-white. In May several White Mound phase surface structures were excavated near Gallup, although no pit houses were located. Also in May, in a joint undertaking with E. H. Sellards of the Texas Memorial Museum, Fred Wendorf and A. E. Dittert dug a small section at the Clovis Site at Blackwater Draw, where they obtained bone and soil samples but no stone artifacts. However, they did find a worked bone implement in the basal gray sand, the Clovis level. Early in June a San Andres phase ceremonial structure and 3 dwelling rooms were dug on the Rio Bonito, near Capitan. During a relatively slack period in salvage work a Reserve phase semisurface pueblo was excavated a few miles south of Reserve. While this is outwardly a surface structure, two of the rooms had pit house features — ventilator, deflector, and hearth alignment.

COLORADO. The University of Colorado Museum had 2 parties in the field during the summer. Under Joe Ben Wheat during the first part of the summer a party of three excavated a Basketmaker III site near Yellowjacket. Later, Hugo Rodeck worked in a cave containing Pleistocene fossils and some artifacts indicating at least a temporary occupation by man.

Robert Lister and 15 students, at the University of Colorado Department of Social Sciences Archaeological Field Session at Mesa Verde, excavated beneath an early Pueblo III site in order to expose an earlier building, and also investigated several small Basketmaker III and Pueblo I sites.

Assembled by EDWARD B. DANSON

PLAINS

At this writing, field parties are heading for their respective digs in the Plains, as described in the July issue. Their activities will be reported in the next issue.

The 14th Plains Anthropological Conference will meet at the Laboratory of Anthropology, University of Nebraska, Lincoln, during the Thanksgiving weekend, November 22-24, 1956. As of this writing, one of the highlights of the program will be a panel discussion dealing with the relation of the Plains to surrounding areas. There will also be a group of brief reports, with slides, of current field work in the Plains-Prairies, and a series of formal papers. Richard P. Wheeler, Chairman, will send out an announcement and call for papers the latter part of September. Inquiries should be addressed to him care of 14th Plains Conference at the Laboratory.

Assembled by E. MOTT DAVIS

NORTHEAST

NEW HAMPSHIRE. The formation of the Monadnock Chapter of the New Hampshire Archeological Society promises to provide additional information on the archaeological material in this state. The program for this chapter's activities includes instruction in archaeological theory and method as well as a site survey of southwestern New Hampshire. A colonial house site has been excavated as a part of the instruction program.

NEW JERSEY. The New Jersey State Museum did salvage excavation as the Steppel site, Hanover, Morris County, during June of 1956. Donald Hartle conducted the field work with the aid of Janet Arcuni. Several burials were encountered and the site produced many bannerstones.

A report on the excavation of the Buri site in Burlington County is expected this fall. This excavation was carried out during the summer of 1955 in connection with a field school organized under the auspices of Temple University. Ronald J. Mason directed the work. The site produced indications that it was occupied over a fairly extensive period of time.

Plans for flood control projects along the Delaware River promise to require considerable archaeological work in the area.

The Archaeological Society for New Jersey has changed the format of its News Letter and is publishing it 4 times a year.

NEW YORK. The Caughnawaga village site near Fonda continued to be excavated under Father Thomas Grassmann's direction. This year the approximately 2000 cubic yards of topsoil which had been pushed off the occupation area was screened. Many of the areas indicating former fires were also investigated. A map of the site has been completed and shows the relationship between each of the 12 longhouses and the stockade which surrounded the village.

Marian E. White and Alfred K. Guthe conducted an archaeological survey of western New York for the Rochester Museum of Arts and Sciences. Many sites were plotted on the U.S. Geological Survey Topographic sheets. They also worked with the Lewis H. Morgan Chapter of the New York State Archaeological Association in excavating the Appleshed site, an early Iroquois occupation near Geneseo, Livingston County.

Peter P. Pratt continued his archaeological study of the Oneida Iroquois during the 1956 season. His activities were concentrated in the Hamilton-Oneida-Syracuse area of New York State.

The Van Epps-Hartley Chapter of the New York State Archeological Association continued their excavation of the Chapin Site, a Mohawk station in the Mohawk Valley.

ONTARIO. The Royal Ontario Museum, with the support of the Serpent Mounds Foundation, continued the excavation of the Serpent Mounds on Rice Lake, in Peterborough County. Kenneth E. Kidd spent part of the 1956 season in the Patricia District of Ontario, in the westernmost part of the province, north of the Canadian National Railroad line to Hudson's Bay. His attention was directed toward Indian sites already reported and also to the possibilities for ethnological work in the area.

The University of Toronto excavated a large Point Peninsula (Middle Woodland) site in the St. Lawrence River area. This site is threatened by the St. Lawrence Seaway Project. J. Norman Emerson supervised the work.

The Ontario Archaeological Society conducted a survey of the Rouge River, in York County. This project was not completed and continued work on it is planned. The society is also continuing its long term project of recording material in private collections on 35 mm. film.

PENNSYLVANIA. Jacob W. Gruber, Temple University, developed plans for a site survey of southeastern Pennsylvania. This is sorely needed and will be most helpful as a record of known sites, particularly those showing promise of yielding important information regarding the Indian occupation of that area. Gruber is working closely with the southeastern chapter of the Society for Pennsylvania Archaeology.

Assembled by ALFRED K. GUTHE

SOUTHEAST

FLORIDA. John Goggin reports that the University of Florida has tested a site on the St. Johns with a sequence from preceramic material through Orange Fiber-tempered material, St. Johns I and St. Johns II. The University Survey of the Florida West Coast, opposite

Gainesville, is continuing, and further work has been done on the Weeden Island period Hughes Island mound, which is yielding a great deal of restorable ceramic material. Test excavations and surface collecting at the newly discovered Fox Pond site on the outskirts of Gainesville is adding to our information on Spanish-Indian culture of the second quarter of the 17th century.

Florida State University operated its field school at the Luis Mission site, one of the larger and better known sites of the Spanish Indian and Leon-Jefferson periods in Florida. Charles Fairbanks and Hale Smith, with their students, have also been collecting on another Spanish Indian site, dated by Goggin on the basis of the majolica collection as having been occupied just before the middle of the 17th century. The site was revealed by grading operations on the new access road on the edge of Tallahassee.

Florida State Museum salvaged the remains of a small mound near Gainesville. It can be correlated with the late Weeden Island I period. A mass sherd deposit and a great many secondary burials, both single bundles and masses of bone representing up to 10 people, were the major features.

Low water levels all over the state of Florida have resulted in the discovery of a number of muck and water-preserved primitive canoes. Particularly important are a specimen which can be dated as the earliest known Seminole canoe, recovered from the Oklawaha River by the University of Florida; a prehistoric square-ended specimen associated with Fort Walton sherds recovered by Florida State University; and another Seminole specimen from Key Vaca, found in the muck while excavating for a new school. A feature of the last is copper patches held on with cut copper nails. Henry Field of Miami will report on this canoe.

Dan Laxson of Hialeah has been working extensively in the late Glades culture Madden site where he has found some quantity of Spanish material, particularly dateable majolica sherds.

Goggin, Fairbanks, and Sears appeared before the State Road Commission in June to enlist their help in initiating a program of Highway Archaeological Salvage in Florida. The Commission fully approved the principles involved and is working out the details of actual physical cooperation. It is expected that a program will be under way by late summer.

GEORGIA. A. R. Kelly reports for the University of Georgia that William Sanders conducted a survey of the Ocmulgee River during the summer, revisiting sites located by Willey in 1936. Tests were made in a number of stratified sites.

Phillip Smith continued his survey of stone mounds and walls in North Georgia. A recently discovered 5-sided structure near Cornelia is of particular interest.

The Columbus Museum of Arts and Crafts sponsored a second season of work at the stratified Ruud Plantation site on the Chattachoochee River below Columbus, Georgia. Joseph Caldwell was in charge.

A. R. Kelly, for the University of Georgia, and Lewis Larsen, for the Georgia Historical Commission, continued their work at the Etowah site. Larsen worked in the interior of Mound C, after 2 seasons of work with elaborate Southern Cult burials around its periphery. Kelly worked with Etowah and Wilbanks period structures in the village.

TENNESSEE. Bettye Broyles, assisted by members of the Knoxville Chapter of the Tennessee Archaeological Society, has done extensive work in a cave near Bridgeport, Alabama. Limestone tempered pottery runs to a depth of 6 feet with check and complicated stamped as the dominant decorated wares. Pickwick Complicated Stamped sherds, which can be matched with the Georgia Swift Creek ware, and a version of late Napier Complicated Stamp are of particular interest. Broyles is preparing a report on her work. The Smithsonian Institution, represented by Matthew Stirling and Carl Miller, is now conducting more extensive archaeological investigations in the cave.

The Memphis Chapter of the Society, and Shelby County, aided by the University of Tennessee, with technical direction by Charles Nash, are completing their work on the Fuller Site, a large Middle Mississippi ceremonial center. A great deal of digging has been done in stratified village midden, indicating occupation from Early through Late Mississippi. Reconstruction of a palisade and other features are part of a project to develop the site into a permanent park with in-place exhibits. Development is progressing with the assistance of the Tennessee Department of Conservation.

VIRGINIA. With the exception of 2 wells, excavations on Jamestown Island relating to 17th century colonial occupation has been concluded. The end of the current archaeological exploration on the site does not, however, mean that the investigations are complete. Only approximately 28% of the estimated 80 acres comprising "New Towne" has been explored in excavations which began in 1934. The well investigations, which were stopped last winter because of flooding, were resumed in August, when ground water was lowest.

Since the close of field work at the beginning of 1956, the staff of Colonial National Historical Park at Jamestown, consisting of Supervising Archaeologist John L. Cotter, assisted by Edward B. Jelks and Museum Curator J. Paul Hudson, has been at work recoding and studying artifacts and data resulting from field work. While much basic data remain to be gathered, the groundwork has been laid for a comprehensive archaeological report on Jamestown to be completed in the next 2 years. Drawings and data for 2 of the 6 major structures excavated between 1954 and 1956 have been completed for Historic American Buildings Surveys and will be submitted to the Library of Congress. The remaining 4 buildings have full archaeological records which will be turned over to draftsmen for recording.

In the course of studying 17th century artifacts at Jamestown, the value of several types of ceramic, iron, and glass artifacts, has been recognized as temporal and

cultural markers. Accordingly a study of ceramic types has been undertaken, and the results of this study will be published in advance of the final archaeological report which is in progress. In effect, this study will be a brief survey and check list of 17th century ceramic wares and main types of Jamestown which will be applicable to many historic sites of the period throughout the United States.

Assembled by W. H. Sears

MIDDLE AMERICA

Western Mexico. The University of California (Los Angeles) carried out extensive excavations near the town of Peñitas, Nayarit, during January to April. The project was financed by a grant from Phil Berg, Los Angeles executive, who also assisted in the field. The field work was organized by George W. Brainerd of U.C.L.A., and following his sudden death, was continued by C. W. Meighan. The field superintendents were Ernst Goldschmidt of U.C.L.A. and Jacques Bordaz of Columbia University. A number of mounds were excavated and in some cases pottery was found in deposits 5 m. deep. The mounds appear to be of Toltec date. Large quantities of elaborately decorated pottery (incised and polychrome) were recovered; preliminary examination indicates the decorated pottery to be more abundant and more finely detailed in design than contemporary pottery from the Valley of Mexico. A few copper implements were found, including pins, tweezers, and a bell. Architecture includes stone-faced platform mounds, with natural river cobbles used for facing and stairways. Mortuary customs include both flexed burial and cremation. The size and contents of the sites in this part of Mexico indicate that the region was a major Toltec center.

Oaxaca. For 4 seasons students of Mexico City College have been excavating the small site of Yagul near Mitla, Oaxaca. The project was initiated by Ignacio Bernal and is under the direction of John Paddock. The site was occupied continuoutly from Monte Alban I times till the Spanish conquest or shortly before, and furnishes particularly important material on late preconquest periods, not as well represented at other well known sites of Oaxaca. Early this year 8 weeks were devoted to excavation, and an interesting item uncovered was a polychrome mural in the Mixtec style, which may prove capable of restoration. To allow time for the study and publication of material already in hand, no excavations are planned for the 1956 season. John Paddock is at present on leave and will return in June, 1957.

Maya Area. In anticipation of major excavations planned at Tikal, the University of Pennsylvania Musuem sponsored an expedition under the direction of Edwin M. Shook of the Carnegie Institution staff, who last January began large scale clearing of the site and the setting up of a permanent camp at the ruins. At the beginning of the season Shook was assisted by Peter Mack of Stanford University, who unfortunately was forced to leave at the end of 3 weeks due to an accident that injured his hand. In the course of the season, which lasted through May 15, about 8 km. of road were opened and large areas, including the main plaza, were cleared of underbrush to give access to the principal buildings. Seven houses were built to serve as dormitories, dining halls, and laboratories. An initial attempt to dig wells by hand was not successful, but well-drilling equipment was sent in this summer and no doubt by now the camp has a dependable water supply. In the course of clearing operations, a second ball court was discovered, as well as several previously unknown reservoirs and an artificial "aguada." The prize find of the season was the splendidly carved and well preserved Stela 22 with its accompanying Altar 10. The stela has a clear period-ending date marking the end of Katun 17. The monuments are in an enclosure that probably was thatch roofed, and face south on a small court delimited by 3 structures, those of the east and west being square, flattopped pyramids ascended by 4 stairways. This arrangement was found to occur 5 times, associated, in those cases where the dating is clear, with records of completed Katuns.

The location of a village occupied 70 or 80 years ago, and reported by early explorers, may prove of interest, and supplements the collection of pottery, which includes wares of the Chicanel and later phases, with a sample of relatively recent date.

One of the projected operations for next season is the beginning of a map, which is planned to cover 16 sq. km. and will include part of the residential area as well as the known ceremonial groups at Tikal. The government of Guatemala is enthusiastically aiding and supporting the project and plans to reserve an area of over 500 sq. km. as a national park for the preservation and scientific study of the natural environment. Biologists from the University of Michigan have already availed themselves of the opportunity afforded by the camp and the clearing operations to join the expedition and to make studies of the herpafauna of the region. The expedition was also visited by the chief archaeologist of the project, Linton Satterthwaite, Jr., who spent 3 weeks at Tikal toward the end of the season.

Last March, A. H. Anderson, Archaeological Commissioner of British Honduras, excavated with the aid of a Wenner-Gren grant an Early Classic tomb (B2) at the site of Caracol. The tomb, in a vaulted chamber under a platform, contained 2 superimposed burials, the upper of which had been cleared in 1953. The originally sealed lower level, in addition to the fragmentary skeleton, contained rich mortuary furniture, among which were basal-flanged bowls, 2 beautifully carved shell ear plug discs inlaid with jade and mother of pearl, each with a small jade flare and a pearl drop, and a curious and unusual carving representing a human skull with its jaw forming a loop handle. Anderson located several other graves and explored the mound complex containing a Late Classic tomb, B1, partly excavated in 1953, there also finding steps leading to a lower level. Exca-

vations were extended to the Temple of the Wooden Lintel, and traces of carving were found on Stela 12, which formerly was thought to be a plain monument.

The field work of the Belize River project directed by Gordon R. Willey of Harvard was completed in a final season lasting from early February through April, with Wm. R. Bullard, Jr., and John Ladd assisting. The project is concerned with the study of ancient Maya settlements along the Belize River from the site of Never Delay to the Guatemala border. It shows that the river bank was continuously occupied from Formative through Classic times by virtually contiguous settlements interrupted only by the narrowing of the alluvial pockets. Until this season most of the work was concentrated at Barton Ramie, where mounds tested by stratigraphic trenches now total 64, including the 22 trenched this season. This year the work was extended to Baking Pot and the river-bottom site of Spanish Lookout, near Barton Ramie. Both sites were mapped and tested with pottery trenches, revealing that Baking Pot, formerly known only as a Classic Period site, was already settled in Chicanel (late Preclassic) times. The emerging pattern of continuous dense settlement along the Belize River should have interesting implications for the reconstruction of Maya history as well as for studies of Maya economy and social organization. The season at Palenque began late this summer due to intensive work of consolidation of buildings at Uxmal, where Alberto Ruz Lhuillier, assisted by César Saens and Hipólito Sanchez, expected to finish the northern range of the Monjas quadrangle before leaving Yucatan. This range was built in 3 stages and has a highly ornate upper facade, most of which can be successfully restored. To strengthen the construction without spoiling the original effect, reinforced concrete lintels were installed behind wooden beams spanning the doorways. Concurrently work was continued on the Adivino, the Palace of the Governors, the roof-comb of the Palomas and the temple of the Cemetery Group.

E. Willys Andrews made 2 trips to Yucatan this year, where he explored Xcaret, a large site which may have been the taking-off place of pilgrims to Cozumel in ancient times. We have no report as yet on his conclusions, but we understand he found material of Classic date and believes that East Coast architecture can be traced back to Classic origins here. He also discovered remains he believes to be those of a mission church known to have been established at Pole in colonial times.

Gordon Ekholm, accompanied by Paul Tolstoy and his wife, Robert Rands, and Carlos Navarette, spent a pleasant and rewarding season excavating at Comalcalco from March till early June, after which Rands joined Ruz Lhuillier at Palenque. Comalcalco appears to be a Late Classic site with purely Maya affiliations and a ceramic complex related to that of Palenque and eastern Tabasco. The temples have the floor plan of Palenque temples and resemble them in roof form and abundant stucco decoration. They are vaulted and built of fired brick. Eleven excavations of varying size were made to sample different constructions and obtain stratigraphic data. The most extensive was in a large palace on the acropolis, a long building divided by a medial wall into a series of rooms on the east and a long open gallery on the west. The medial wall has 2 doorways spanned by unusual stepped vaults, one of them 5.30 m. wide. A small temple structure on the northwest extension of the acropolis was thoroughly investigated and revealed a long series of rebuildings. Here, as everywhere else at the site, the sequence showed structures of earth covered with plaster, followed by construction of fired brick.

The discovery of another well-preserved and finely carved lintel from the Lacandon area by Wolfgang Cordan and Robert Bruce was reported in the Sapulpa Herald (Oklahoma) on April 22. The lintel is from the site of Kuna, about 2 leagues from Bonampak. It bears an Initial Series date of 9.15.15.0.0, and depicts a seated figure holding a ceremonial bar of unusual design.

Assembled by TATIANA PROSKOURIAKOFF

LOWLAND SOUTH AMERICA

CUBA. Paul G. Hahn of Yale University spent the summer of 1956 excavating nonceramic (Ciboney) sites in eastern Cuba with the aim of establishing a chronological sequence.

LESSER ANTILLES. Marshall McKusick of Yale University undertook survey and excavation on the island of Dominica during the summer of 1956. His goal was to locate sites of the Island Carib, not heretofore definitely reported for the island, and, using the direct historical approach, to work back to the time when the Island Carib took over from the preceding Arawak in the hope of getting some evidence as to when this invasion took place.

PERU. During the spring and summer of 1956, Donald Lathrap investigated the site of Yarina Cocha, upper Ucayali River, eastern Peru, on behalf of the American Museum of Natural History. Stratigraphic excavation revealed a sequence of 3 distinct cultures. The upper is modern Shipibo, a group of which still resides on the site. The middle horizon produced incised pottery reminiscent of the Barrancas style of the Lower Orinoco. Beneath was a complex characterized by a different kind of incised pottery and numerous fired clay balls. Lathrap's work is the first stratigraphic archaeological investigation ever done in the Montaña region of South America, and promises to contribute much-needed information on prehistoric highland-lowland cultural relationships.

URUGUAY. A site on a tributary of the Rio Cuareim, which forms the boundary between Uruguay and Brazil, was investigated in May of 1956 by an expedition from the Museo Nacional de Historia Natural, consisting of José Joaquin Figueira and Mr. and Mrs. Ricardo Romero. The site consisted of a number of flat basalt rocks, some buried with their face flush with the ground surface, others of more irregular shape lying on the surface.

Petroglyphs, carved on the flat surfaces, include a bird, a snakelike figure, several circles containing crosses reminiscent of a certain type of bola stone with a double groove, a horseshoe-like design and several unidentifiable figures. Scattered among and around the rocks were a considerable number of stone implements: flakes, saws, knives, scrapers, drills, sling stones, arrow points similar to Bird's Period IV from Patagonia, cores, and bola stones. The material is predominantly basalt and quartzite. On the chance that the petroglyphs may have marked a burial, the stones were excavated. No skeletal remains were found, but since the spot is subject to inundation during the rainy season, such evidence could have been destroyed. The area between this site and the Rio Cuareim, some 800 m. to the north, was surveyed and several other petroglyphs with associated stone artifacts were found.

Assembled by BETTY J. MEGGERS

EARL H. MORRIS SCHOLARSHIP FUND FOR ARCHAEOLOGY

In commemoration of Earl H. Morris, who died of a heart attack on June 24, 1956, a scholarship fund has been established at the University of Colorado. Many of his friends and admirers will wish to contribute, and all donations, whether large or small, will be welcome. Contributions should be sent to the Division of Anthropology, University of Colorado, Boulder, Colorado. Please make checks payable to the University of Colorado.

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DE LAGUNA, FREDERICA

1953 Some problems in the relationship between Tlingit Archaeology and Ethnology. In "Asia and North America: Transpacific Contacts," assembled by M. W. Smith. *Memoirs of the Society for American Archaeology*, No. 9, pp. 53-7. Salt Lake City.

HEIZER, R. F. AND FRANKLIN FENENGA

1939 Archaeological Horizons in Central California. *American Anthropologist*, Vol. 41, No. 3, pp. 378-99. Menasha.

MACGOWAN, KENNETH

1950 *Early Man in the New World.* Macmillan, New York.

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